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OHIO RIVER POLLUTION SURVEY. VOLUME III. MAJOR TRIBUTARY BASINS

Public Health Service
Cincinnati, Ohio

1942

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FEDERAL SECURITY AGENCY
U. S. PUBLIC HEALTH SERVICE
CINCINNATI, OHIO
1942

OHIO RIVER POLLUTION SURVEY

FINAL REPORT
TO THE
OHIO RIVER COMMITTEE

VOLUME III

(Of Three Volumes)

MAJOR TRIBUTARY BASINS

SCIOTO
LITTLE MIAMI
LICKING
WABASH
GREEN
MIAMI
KENTUCKY
SALT
CUMBERLAND
TENNESSEE

1798

Prepared at the request of the War Department
by the U. S. Public Health Service in cooperation
with the Corps of Engineers, U. S. Army.

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FINAL REPORT - OHIO RIVER POLLUTION SURVEY

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INTRODUCTION TO DRAINAGE BASIN SUMMARIES

The basic information of the Ohio River Pollution Survey has been presented in summaries covering the main Ohio River, minor tributary basins and the nineteen major tributary basins. An effort has been made to have each summary complete in itself. Certain explanations, applicable to each, have been made in this section to avoid repetition.

Insofar as possible, information for each basin is preseted in as near identical form as possible, according to the following general outline:

Syllabus and Conclusions
Description
Presentation of Field Data
Presentation of Laboratory Data
Hydrometric Data
Discussion

Accompanying the text are a number of tables, maps and charts. With the exception of the division on the main Ohio River, similarly numbered tables and figures cover similar material in each basin summary.

In the tabulations of costs (Table 1) the annual charges are based on interest rates of 3½% for municipal and 5% for industrial construction and periods for amortizations of 40 years for interceptors, 20 years for municipal treatment plants and 10 years or less for industrial corrective measures. Studies of interest rates and life of treatment facilities have indicated that these figures represent about the average experience of municipalities and industries. Cost estimates of individual projects are not shown except in a few cases where they are based on engineering surveys. Since most of the estimates are not based on detailed studies of each situation they may be considerably in error in individual instances. Grouped for an entire basin, the probability of error is greatly reduced and it is believed that the figures shown are an accurate indication of the cost of the suggested pollution abatement program. Costs of providing lateral sewers or for the extension of sewers to areas now lacking them are not included in the estimates.

The urgency of the individual projects for which cost estimates have been made is far from uniform. Some projects are needed to correct critical pollution conditions while in other cases the need and justification for the expenditure is less outstanding. The basin summaries place stress on the more critical and larger sources of pollution where effects are not confined to local areas. However, cost estimates presented apply not only to the urgent situations but to a complete program of pollution control such as might take place during the course of the next 10 to 20 years. In the special case of a stream highly acid from the effects of mine drainage, expenditure of public funds for acid reducing measures should precede or at least parallel expenditures for sewage and organic pollution abatement.

Cost estimates are based on average experience from 1928 to 1940. Costs for 1942 would be considerably higher and future costs will probably be subject to further change depending upon fluctuation in construction costs for this type of work.

Throughout the report quantities of organic industrial wastes have been expressed as "sewered population equivalent (B.O.D.)".* Extensive measurements have shown that the average oxygen demand of domestic sewage is .168 pound (5-day,20°C.) per capita per day and this factor has been used to convert industrial waste loads to a readily understandable basis. In the tabulations of sources of pollution (Table 3), the column "Sewered Population Equivalent (B.O.D.), Untreated" represents the total of the population connected to sewers plus the population equivalent of industrial wastes discharged at each locality. The difference between this column and the adjacent column "Sewered Population Equivalent (B.O.D.), Discharged" represents the reduction in the pollution load due to treatment in a municipal treatment plant.

Where accurate laboratory results of treatment plant operation were available, these were used to determine the pollution load both before and after treatment. In the absence of such records reductions of 35% by primary treatment and 85% by secondary treatment were assumed.

No differentiation has been made in the tables, maps or charts between industrial wastes which are discharged only seasonally and those which are discharged throughout the year. The pollution loading shown represents conditions during normal operations at the height of the season. In the case of the canning industry, this may occur only during a few weeks in the year but these few weeks are often during the late summer when the effects of organic pollution on the oxygen balance of the stream are most serious. On the other hand, the season for distillery operations in most cases is during the winter months when the effects of oxygen depleting pollution are less serious.

---

* Biochemical Oxygen Demand (5-day 20° C.).

Nowhere in the report has a quantitative statement been made as to the reduction in the industrial waste pollution load due to treatment, recovery, or other measures at the industrial plant. Such a statement would necessitate a definition of the strength of untreated industrial wastes from each type of industry. This is impracticable since the strength of the wastes depends to a large degree on plant practices which vary widely. For instance, in some meat packing plants all blood, paunch manure and offal are recovered and in others these materials are discharged to the plant sewers. Wastes discharged from vegetable canneries have been found to vary by as much as 400% due to differences in "housekeeping" methods. Wastes from paper mills vary depending on the use of save-alls, recirculating systems and other pollution reduction measures. At some plants reduction in pollution is inadvertent and is brought about by the recovery of valuable by-products or prevention of waste of raw materials. At others expense is incurred which produces nothing but a reduction in pollution discharges. Tabulations of industrial wastes (Table 4) shows the number of plants that have taken steps of either kind which result in some reduction in the pollution load from the plant.

SCIOTO RIVER BASIN

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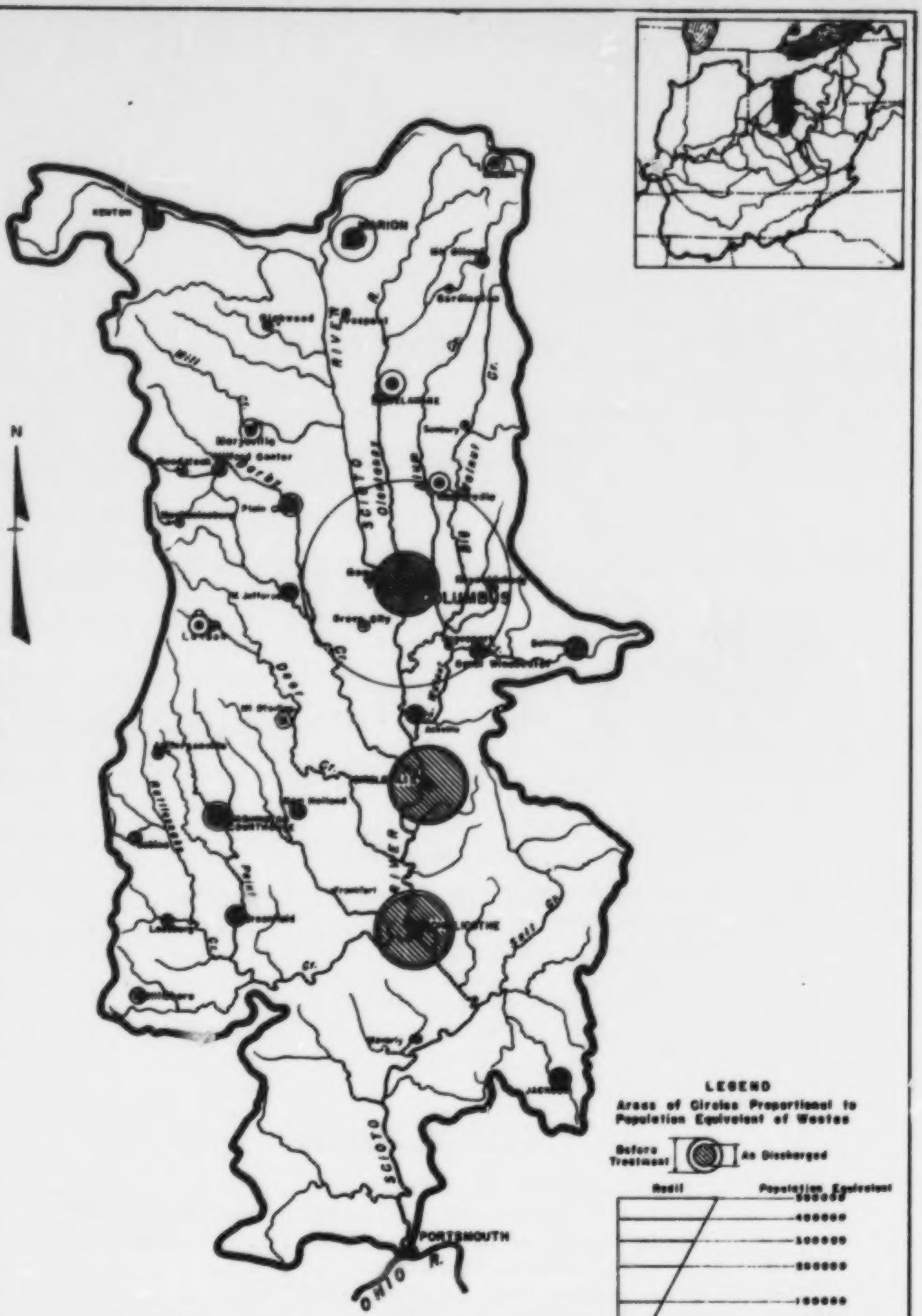
KENTON
MARION
Mt. Gilead
Cardington
Richwood
Prospect
Delaware
Marysville
Plain City
Westerville
COLUMBUS
Grove City
London
Canal Winchester
Circleville
Washington C.H.
CHILLICOTHE
JACKSON
PORTSMOUTH
OHIO R.
SCIOTO RIVER
Olentangy
Big Walnut
Darby
Deer Cr.
Paint Cr.
Salt Cr.
Mill Cr.
Rattlesnake
N
LEGEND
Areas of Circles Proportional to Population Equivalent of Wastes
Before Treatment
As Discharged
Radii
Population Equivalent
500000
400000
300000
200000
100000
50000
25000
10000
5000
1000

Fig. Sc-1

SCIOTO BASIN

SOURCES OF POLLUTION

10 0 10 20
SCALE OF MILES

OHIO RIVER POLLUTION SURVEY
U. S. PUBLIC HEALTH SERVICE
1941

SCIOTO RIVER BASIN

Syllabus and Conclusions

Syllabus

The Scioto River Basin lies wholly in Ohio and comprises 6,510 square miles, including the Columbus metropolitan area and ten other cities of from 5,000 to 30,000 population. Most of the basin is a highly developed agricultural area. The total population is about 740,000, of which 60 percent is urban. More than half of the population is in Franklin County (Columbus). Commendable progress has already been made toward pollution abatement. The present lack of practical methods of industrial waste treatment deters further progress in certain sections. Pollution control by increasing low-water flow offers possibilities in further improving conditions below Columbus.

Conclusions

(1) Most of the municipalities in the basin have developed underground water supplies which appear to be adequate. In general, pollution is not seriously affecting public water supplies. There is an increasing demand for cleaner streams for recreational use, particularly in the vicinity of Columbus.

(2) Sewage from a population of about 412,000 and industrial wastes with a sewered population equivalent of 426,000 are discharged to sewers. More than 95 percent of the sewage is treated. This treatment, plus treatment of industrial wastes in municipal treatment plants, reduces the total population equivalent of the wastes from 838,000 to 251,000.

(3) The laboratory results indicate that the Scioto River, Paint Creek and sections of certain other tributaries south of the latitude of Columbus would, at the present time, be unfit as sources of water supply because of the high bacterial content. Above Columbus, except in local zones, the situation appears much better. As regards other uses, the situation is similar to the above but less critical.

(4) The Scioto River below Columbus carries considerable residual pollution from the city. The Columbus sewage treatment works is designed to maintain not less than 3 p.p.m. dissolved oxygen below Columbus at all times. This should be possible except at times of local rains. On account of these local rains oxygen conditions suitable to maintain fish life below Columbus require an estimated minimum flow of 75 c.f.s. in addition to the sewage effluent from Columbus.

(5) As the 75 c.f.s. minimum flow is required only for a matter of hours during local flash floods, a suggested solution involves use of limited storage as at Whittier Street Dam at Columbus. A drawdown of 0.85 feet, to which there appears to be no objection, would supply the necessary flow for 12 hours. A trifling capital cost and no additional annual maintenance would be required in providing this flow.

(6) An estimated 22 c.f.s. can be maintained by the proposed Delaware flood-control reservoir. This sustained flow would improve the stream to a limited extent and would replace water stored above Whittier following use during local flash floods.

(7) Several sections of tributary streams are grossly polluted. These are primarily local problems and the tributaries, with the exception of Paint Creek, are in suitable condition for all normal uses at their confluence with the Scioto.

(8) In view of the normal uses of the streams involved, refined treatment at certain sources of pollution would serve no purpose commensurate with the expenditure. In these instances, lesser treatment appears justified.

A summary of comparative cost estimates of remedial measures from Table Sc-1 follows:

Treatment	Capital Cost	Annual Charges
Existing	$12,890,000	$1,090,000
Suggested Additional	1,300,000	180,000

Estimated additional costs, over existing charges, of programs involving uniform treatment throughout the basin are:

Primary, all places	1,060,000	150,000
Secondary, all places	1,700,000	225,000

Table Sc-1 Scioto River Basin - Estimated Cost of Existing and Suggested Minimum Corrective Measures for Municipal and Industrial Wastes, with Comparative Costs for Primary and Secondary Treatment.

	Number of Plants		Population Connected to Sewers	Capital Investment (Dollars)	Annual Charges (Dollars)		
	Prim.	Sec.			Amort. & Interest	Operation & Main.	Total
Existing Sewage Treatment	15	18	401,500	12,890,000	740,000	350,000	1,090,000
Suggested Minimum Correction							
Sewage Treatment Plants	18	4	11,100	670,000	50,000	30,000	80,000
Required Interceptors			-	260,000	10,000	-	10,000
Independent Industrial Waste Correction				370,000	50,000	40,000	90,000
Total				1,300,000	110,000	70,000	180,000
Comparative Cost							
Primary Treatment All Waste				1,060,000	90,000	60,000	150,000
Secondary Treatment All Waste				1,700,000	140,000	85,000	225,000
As Suggested				1,300,000	110,000	70,000	180,000

Description

The Scioto River Basin, 6,510 square miles in area, occupies the central and south central portion of Ohio. The river rises in the flat Till Plains near Marion and flows in a generally southerly direction to its confluence with the Ohio River at Portsmouth.

Major Tributaries	Miles Above mouth of Scioto River	Drainage Area Square Miles
Salt Creek	51	553
Paint Creek	63	1,143
Deer Creek	85	408
Darby Creek	100	557
Little Walnut Cr.	106	281
Big Walnut Creek	117	557
Olentangy River	132	536

Larger Cities	Populations			
	1910	1920	1930	1940
Columbus	181,511	237,031	290,564	306,087
Marion	18,232	27,891	31,084	30,817
Chillicothe	14,508	15,831	18,340	20,129
Total Basin				
Rural	274,691	268,896	269,434	291,761
Urban	272,845	341,841	420,506	447,790
Total	547,536	610,737	689,940	739,551

Industries - While the Scioto River Basin is primarily an agricultural area, there are important industries, of which paper mills and canneries predominate. Other industries of lesser importance include meat, milk, metal, chemical and rendering plants.

Water Uses - The City of Columbus secures its water supply from two reservoirs, total capacity six billion gallons, on the upper Scioto River. Flood protection works, required primarily to reduce flood damages at Columbus and downstream, have been studied by local Conservancy Districts and the U. S. Engineer Department.

The Scioto River is not navigable and has no water power developments. Columbus reservoirs are the only ones of appreciable size in the basin. Restricted recreational developments are present on the Scioto River below Columbus.

Presentation of Field Data

Figure Sc-1 shows the location and magnitude of all sources of organic pollution of consequence in the Scioto River Basin. Figure Sc-2 shows similar data and, in addition, location of water supply intakes from streams below sources of pollution and laboratory data on coliform organisms, dissolved oxygen and B.O.D.

Public Water Supplies - Forty-four public water supplies in the basin serve a total of about 480,000 people. Five of these supplies, as shown in Table Sc-2, are from surface sources.

Table Sc-2 Scioto River Basin - Surface Water Supplies

City	Source	Mile (1)	Treatment (2)	Population Served	Consumption M.G.D.
Supplies Below Community Sewer Outfalls					
Columbus	Scioto River	138	LD	332,000	31.40
Delaware	Olentangy R.	164	LD	10,000	0.75
Westerville	Alum Creek	150	LD	3,500	0.19
Other Surface Supplies					
Sunbury	Impounded-Wells	-	LD	700	0.02
Marysville	Mill Creek-Well	-	LD	4,000	0.30
Total - Below Sewer Outfalls				345,500	32.34
Other				4,700	0.32
Total - Surface Water Supplies				350,200	32.66

(1) Miles above mouth of Scioto River.
(2) L - Lime-soda softened, D - Chlorinated.

Above the Columbus supply, most upstream pollution is treated. Storage provides an additional safeguard and the bacterial quality of the raw water is good.

Table Sc-3 Scioto River Basin - Sources of Significant Pollution Including Industrial Waste Expressed as Sewered Population Equivalent (B.O.D.)

Municipality	Stream	Miles Above Mouth of Scioto R.	Population Connected to Sewers	Treatment	Sewered Population Equivalent (B.O.D.) Untreated	Sewered Population Equivalent (B.O.D.) Discharged
Chillicothe (1)	Scioto River	69.6	16,000	Primary	21,500	10,000
Federal Inst.	" "	72.	3,600	"	3,600	3,200
Circleville (2)	" "	99.8	4,900	"	90,700	76,100
Columbus (4)	" "	132.	300,000	Secondary	543,800	48,800
Kenton	" "	209.2	5,100	None	5,200	5,200
Jackson	Salt Creek	75.	4,500	Primary	5,600	4,000
Chillicothe (1)	Paint Creek	66.6	-	None	47,600	47,600
Frankfort	" "	85.	400	Primary	3,400	3,300
Hillsboro (3)	" "	120.	3,000	Secondary	3,100	500
Greenfield	" "	111.2	3,400	Primary	5,700	3,800
Washington C. H.	" "	130.	7,000	"	10,300	5,900
Mt. Sterling	Deer Creek	118.8	800	Secondary	3,000	500
London	" "	141.	2,800	"	4,900	500
West Jefferson	Darby Creek	140.	500	Primary	3,000	2,800
Plain City	" "	150.9	900	Secondary	5,600	3,200
Ashville	Lit. Walnut Cr.	110.	900	Primary	3,200	2,900
Canal Winchester	" " "	130.	1,000	"	2,800	2,500
Baltimore	" " "	141.	600	None	5,800	5,800
Westerville	Big Walnut Cr.	152.	3,000	Secondary	5,100	800
Delaware	Olentangy	158.	8,000	"	8,300	900
Galion	"	216.	6,000	"	6,000	900
Marysville	Mill Creek	173.	4,200	"	5,400	1,000
Marion	Little Scioto	186.	24,000	"	24,000	4,500
Small Sources (35 towns)	-	-	12,000	Various	20,900	16,700
Total	-	-	412,600	-	838,500	251,400

(1) Municipal wastez to Scioto River; most industrial wastes to Paint Creek.
(2) Strawboard plant wastes.
(3) Recent treatment plant. Not in operation 1939.
(4) Treatment plant equipped with storm water holding tanks.

Delaware suffered a serious water shortage in 1930 which might be overcome by supplementary low flow from the proposed Delaware Reservoir. There are no important sources of pollution immediately above Delaware and, in general, remote pollution of consequence receives treatment.

Sewerage - Table Sc-3 shows data on the more important sources of sewage pollution. All but one of the towns of any size have sewage treatment facilities, although not all are adequately equipped or properly operated. More than 95 percent of the sewage is treated.

Industrial Waste - Data on 48 industrial plants, wholly or partly unconnected to municipal treatment, are summarized on Table Sc-4. However, by far the greatest industrial waste load is tributary to present municipal treatment. The Columbus and Circleville treatment plants both handle heavy industrial waste loads.

Table Sc-4 Scioto River Basin - Summary of Industrial Wastes not Discharging to Municipal Treatment Plants, with Total of Entire Industrial Waste Load in the Basin.

Industry	Number of Plants	Industrial Waste Disposal		At Least Minor Corrective Measures Taken	Estimated Population Equivalent (B.O.D.)
		Munic. Sewers	Private Outlets		
Canning	11	1	10	9	32,200
Chemical	4	0	4	3	-
Meat	8	4	4	5	2,700
Metal	7	3	4	4	-
Milk	7	3	4	4	700
Paper	3	0	3	3	39,200
Miscellaneous	8	2	6	5	2,500
Waste Unconnected Munic. Treatment	48	13	35	33	77,300
Waste Connected to Municipal Treatment					348,600
Total Industrial Waste in Basin					425,900

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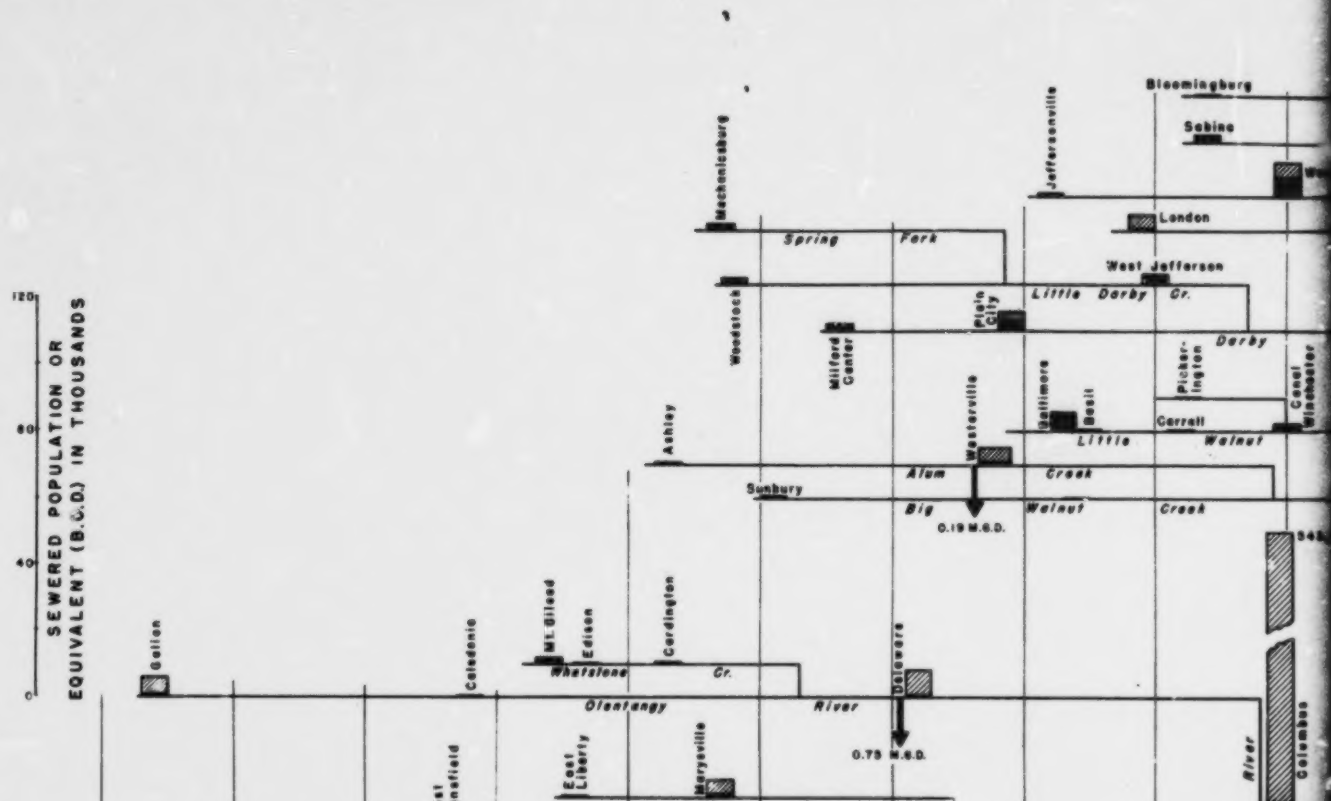

SEWERED POPULATION OR EQUIVALENT (B.O.D.) IN THOUSANDS
120
80
40
0
Bloomingburg
Sabine
Mechanicsburg
Jeffersonville
London
Spring
Fork
West Jefferson
Woodstock
Little
Darby
Cr.
Plain City
Milford Center
Darby
Pickerington
Canal Winchester
Gallimore
Basil
Carroll
Little
Walnut
Ashley
Westerville
Alum
Creek
Sunbury
Big
Walnut
Creek
0.19 M.G.D.
348
Galion
Caledonia
Mt. Gilead
Edison
Cardington
Whetstone
Cr.
Delaware
Olentangy
River
0.75 M.G.D.
West Mansfield
East Liberty
Marysville
Mill
Cr.
Bokes
Cr.
Columbus
Olentangy
River
Alger
Kenton
Mt. Victory
Wildcat
Cr.
Marion
Little
Scioto
R.
Richwood
Fulton
Cr.
Prospect
Hilliards
Rome
Grove City
220
210
200
190
180
170
160
150
140
130
31.4 M.G.D.
Oxygen p.p.m.
Coliforms (M.P.N.) per ml.
100000
10000
1000
100
10
1
12
11
10
9
8
7
6
5
4
3
2
1
0
Negative Oxygen Balance i.e. B.O.D. in excess of D.O.
15.9
Dissolved Oxygen
Coliforms
Oxygen Demand
September-October-1939

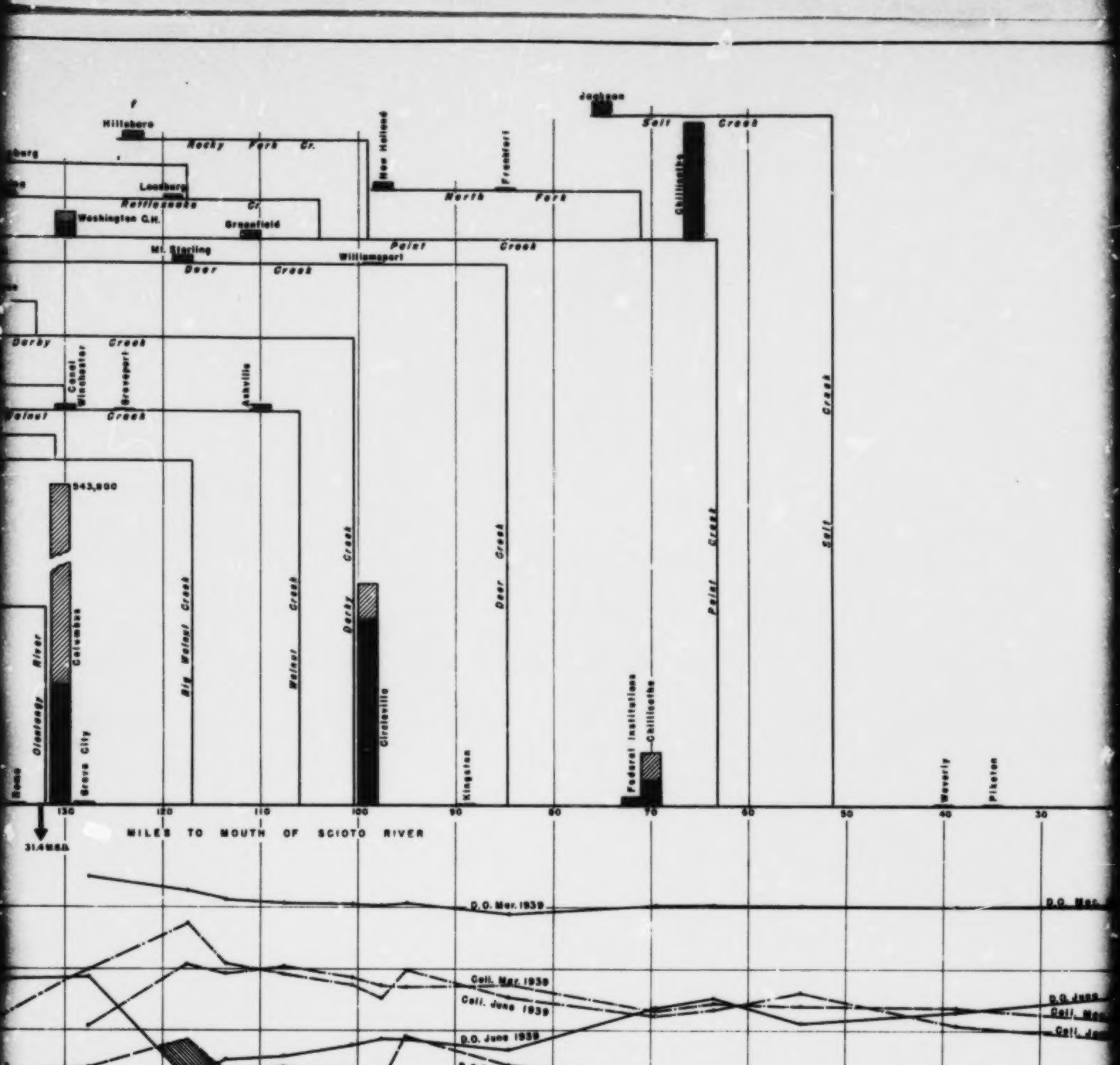
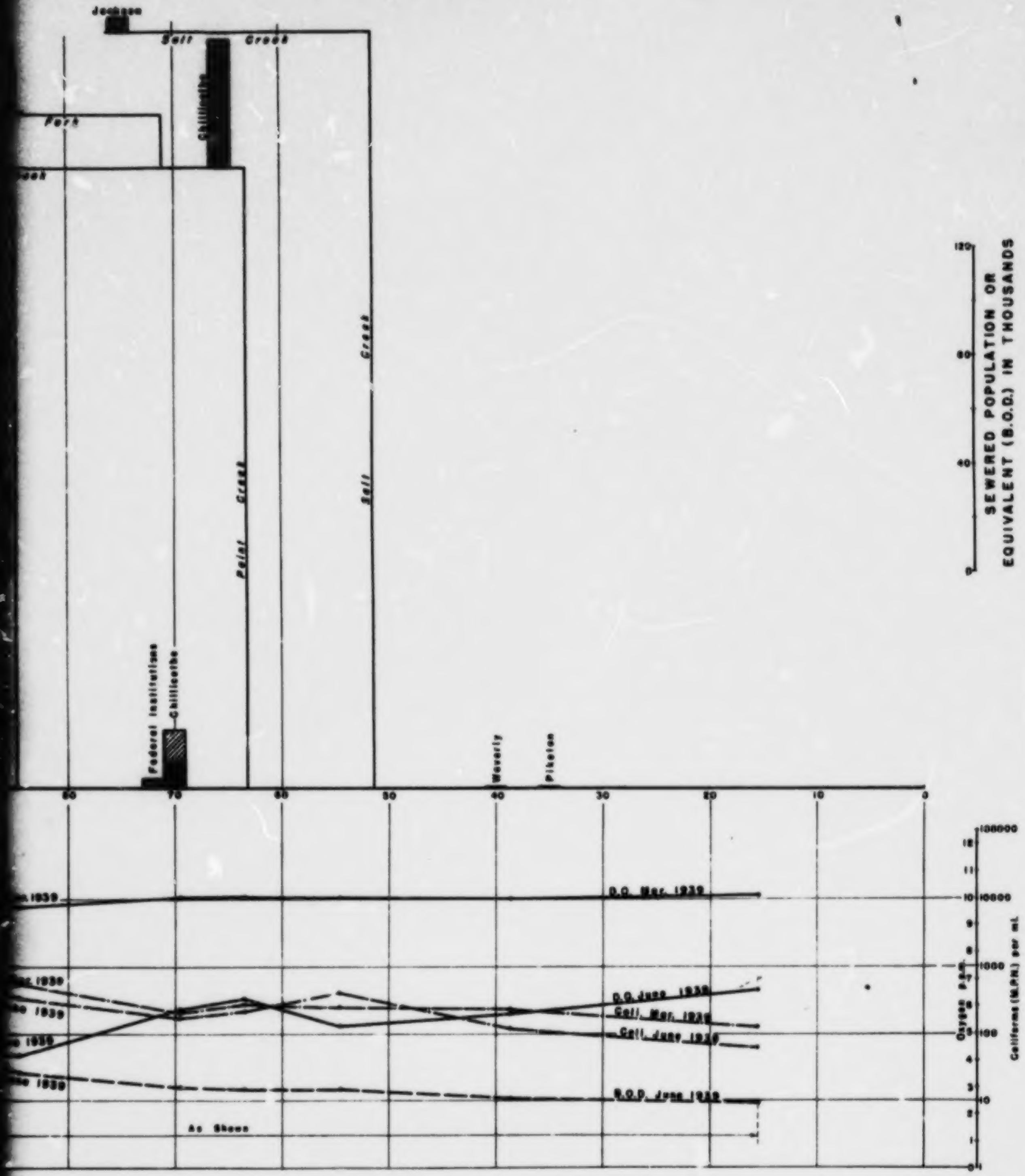

Jackson
Salt Creek
Hillsboro
Rocky Fork Cr.
New Holland
Frankfort
North Fork
Leesburg
Rattlesnake Cr.
Washington C.H.
Greenfield
Chillicothe
Paint Creek
Mt. Sterling
Deer Creek
Williamsport
Darby Creek
Canal Winchester
Groveport
Ashville
Walnut Creek
543,600
Columbus
Olentangy River
Big Walnut Creek
Walnut Creek
Darby Creek
Circleville
Deer Creek
Paint Creek
Salt Creek
Rome
Grove City
Kingston
Federal Institutions
Chillicothe
Waverly
Piketon
130
120
110
100
90
80
70
60
50
40
30
31.4M.G.D.
MILES TO MOUTH OF SCIOTO RIVER
D.O. Mar. 1939
Coli. Mar. 1939
Coli. June 1939
D.O. June 1939
B.O.D. June 1939
D.O. June
Coli. Mar.
Coli. June
B.O.D. June
As Shown
LEGEND
Indicates pollution removed by treatment.
Water Supply Intakes

Fig. - Sc2



LEGEND

▨ Indicates pollution removed by treatment.

↓ Water Supply Intakes

FIGURE-Sc2

SCIOTO RIVER

SOURCES OF POLLUTION
AND
SELECTED LABORATORY DATA

OHIO RIVER POLLUTION SURVEY
U. S. PUBLIC HEALTH SERVICE

494-A

Presentation of Laboratory Data

Summaries of laboratory results for the Scioto River Basin are presented in Table Sc-7. These data have been obtained in part from the operations of three laboratory units connected with the present survey, and in part from the results of a previous survey carried out by the Public Health Service along the main Scioto River below Columbus during the years 1937-39 (these results have been transcribed as monthly averages for the period January-July, 1939). The data for the upper Paint Creek watershed are based on continuing observations from the Cincinnati laboratory in 1939 and early 1940. For the remainder of the basin, the observations were made by mobile laboratories, covering shorter periods of time during September and October, 1939.

Selected average monthly laboratory results at some of the principal points in the basin are tabulated with flows on sampling days and the minimum month on Table Sc-5. In general, the results selected represent the lowest flow conditions during the sampling period.

Figures Sc-3, Sc-4 and Sc-5 show, by spot-map symbols, the distribution of average monthly coliform results, dissolved oxygen content and 5-day oxygen demand, respectively, at the various sampling points throughout the basin, as based on the most unfavorable month of observations at each point. In general, the lower dissolved oxygen results coincided with lower river stages and high temperatures, whereas the higher coliform results tended to occur during months of high stages and low temperature. Along the main Scioto River, the dominant part played by the wastes of Columbus is apparent. In the tributary areas, the worst conditions were observed in the upper Paint Creek watershed, notably below Washington Court House. The section of the basin lying north of Columbus is shown to be relatively clear of heavy pollution, except in local stream zones immediately below the larger towns.

Figure Sc-2 shows the coliform bacteria and dissolved oxygen results as observed in the main Scioto River below Columbus during a typical high water month (March, 1939) and a low water month (June, 1939). The low water dissolved oxygen content of the river below Columbus is shown to have followed a fairly typical "sag" curve, with a first minimum point at about 3 p.p.m. and a secondary minimum of 4 p.p.m. below Circleville. In Paint Creek below Washington Court House, the minimum reached zero oxygen for a distance of about 3 miles in October, 1939.

In contrast were the higher oxygen levels in both streams during the high water months of March, 1939 and 1940, though a tendency toward a delayed oxygen "sag" was shown under those conditions. In general, the observed numbers of coliform bacteria tended to follow a course directly opposite to that of the dissolved oxygen content, being highest at points near the minimum point of the oxygen sag curve.

The laboratory results for the basin as a whole indicate that the Scioto River, Paint Creek and sections of certain other tributaries south of the latitude of Columbus would be unfit as sources of water supply unless extensive sewage chlorination measures were carried out over most of this area. Above Columbus, except in local zones, the situation appears much better in this respect. So far as other stream uses are concerned, the situation indicated by the results is roughly parallel to that above described, except that conditions are shown to be somewhat less critical in portions of the area south of Columbus, as is indicated by comparing Figures Sc-3 and Sc-4.

Table Sc-5 Scioto River Basin - Selected Laboratory Data

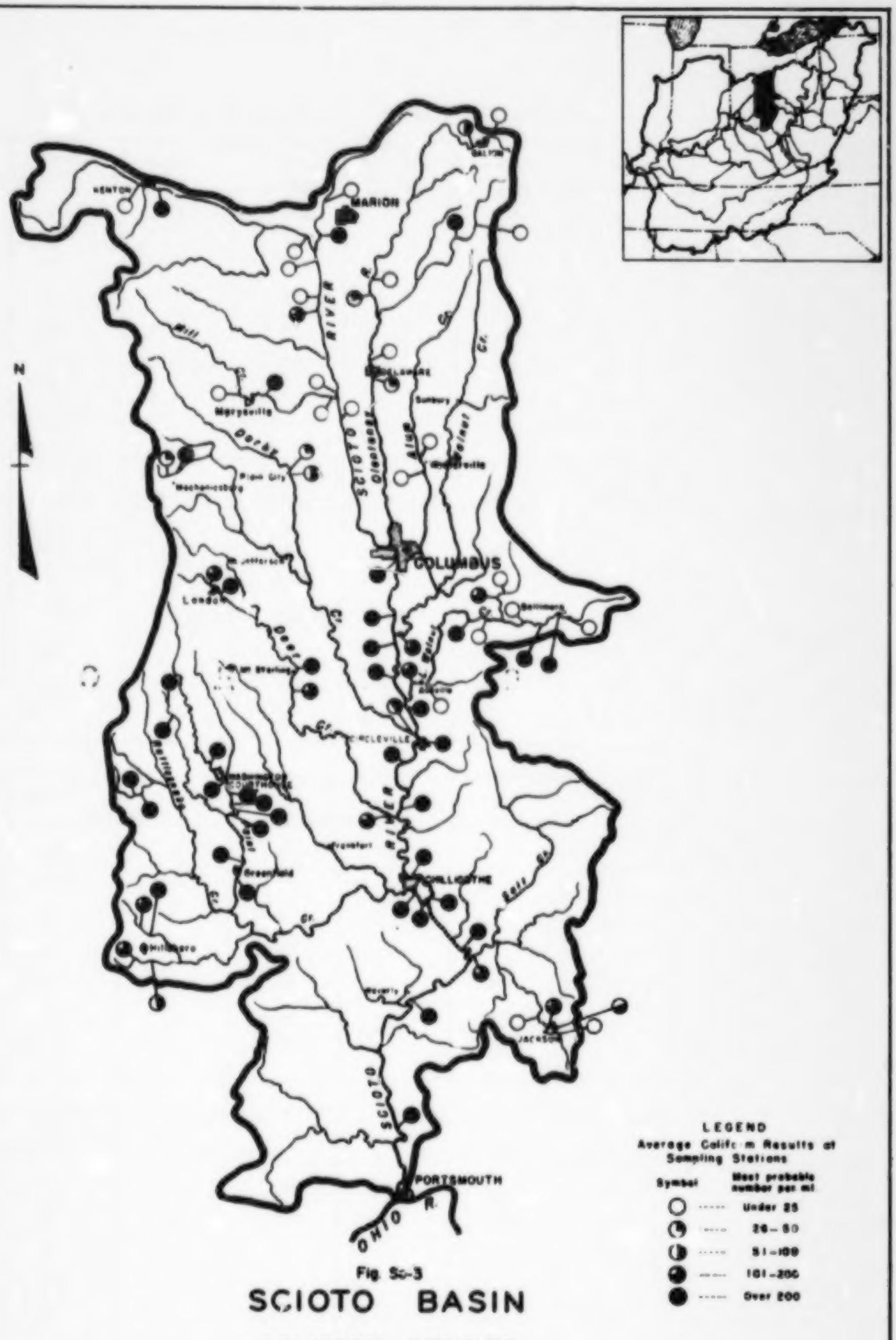
River Location	Scioto		Scioto Upper end Reservoir	Scioto		Scioto South Bloomfield	Scioto above Circleville
	above Kenton	below Kenton		above Columbus	Shadeville		
River Miles Above:							
Mouth of Scioto	210	207	153	129.0	119.8	109.0	99.5
Period - 1939	Oct.	Oct.	Oct.	June	June	June	June
Number of Samples	3	3	1	17	17	17	17
Flow in c.f.s.:							
Sampling Days	2.2	2.2	-	2,680	2,800	3,370	4,360
Minimum Month	-	-	-	-	60	-	-
Water Temperature °C.	15.5	16.8	20.5	23.7	23.1	24.0	23.6
Coliforms per ml.	24	7,400	0	977	5,390	838	347
Dissolved oxygen ppm.	8.6	1.7	6.9	7.1	3.0	3.9	4.6
B.O.D.,5-day,p.p.m.	2.0	7.5	2.6	3.4	4.6	3.3	2.7

River Location	Scioto Penna.R.R. Bridge	Scioto Kellenberger Br.	Scioto - Chil'cothe	Scioto Kilgore Bridge	Scioto - Rigby	Scioto - Waverly	Scioto Mouth Lucasville
River Miles Above:							
Mouth of Scioto	95.5	86.2	70.0	64.3	55.7	38.7	15.0
Period - 1939	June	June	June	June	June	June	June
Number of Samples	17	11	9	9	9	9	9
Flow in c.f.s.:							
Sampling Days	4.360	3,170	6,160	6,190	6,970	7,820	8,390
Minimum Month	-	-	210	-	263	-	-
Water Temperature °C.	24.0	24.2	24.6	24.9	24.5	24.4	24.3
Coliforms per ml.	948	372	198	244	429	136	63
Dissolved oxygen ppm.	4.6	4.1	5.9	6.2	5.3	5.8	6.5
B.O.D.,5-day,p.p.m.	4.6	3.3	2.9	2.8	2.8	2.5	2.2

River Location	Little Scioto R.		Olentangy R.		Little Walnut		Rocky Fk. above Hillsboro
	above Marion	below Marion	above Delaware	below Delaware	above Baltimore	below Baltimore	
River Miles Above:							
Conf. with Scioto	9	9	28	24	36	33	57
Mouth of Scioto	186	180	160	156	142	139	120
Period - 1939	Oct.	Oct.	Oct.	Oct.	Oct.	Oct.	Oct.
Number of Samples	3	3	2	2	3	3	1
Flow in c.f.s.:							
Sampling Days	1.2	1.2	11.8	11.8	2.2	2.2	-
Minimum Month	0.4	0.4	0.5	-	0.0	0.0	0.0
Water Temperature °C.	16.0	15.7	17.5	18.5	8.2	9.8	16.0
Coliforms per ml.	26	38,300	12	26	18	2,730	24
Dissolved oxygen ppm.	10.0	1.8	8.5	10.8	7.4	0.5	7.8
B.O.D.,5-day, p.p.m.	3.7	13.5	3.0	2.9	2.0	87.7	1.2

River Location	Rocky Fk. below Hillsboro	Paint Creek		Paint Creek		Paint Creek	
		above Washington,C.H.	#1 below Washington,C.H.	above Greenfield	below Greenfield	opposite Chillicothe	Mouth
River Miles Above:							
Conf. with Scioto	54	67	65	49	47	3.4	1.3
Mouth of Scioto	117	130	128	112	110	66.5	64.5
Period - 1939	Oct.	Sept.	Sept.	Oct.	Oct.	July	July
Number of Samples	1	1	1	1	1	5	5
Flow in c.f.s.:							
Sampling Days	-	3.0	3.0	2.0	2.0	330	330
Minimum Month	0.0	-	-	0.5	0.5	10.3	10.3
Water Temperature °C.	17.5	20.0	19.0	17.0	17.0	23.0	24.0
Coliforms per ml.	4,600	150,000	240,000	23	24,000	39	156
Dissolved oxygen ppm.	4.2	.4	0	4.6	0.0	7.3	5.7
B.O.D.,5-day,p.p.m.	2.3	7.8	153	2.5	19.5	1.1	13.3

Fig. Sc-3



N
KENTON
GALION
MARION
RIVER
Mill Cr.
Marysville
Darby Cr.
Plain City
Mechanicsburg
DELAWARE
Sunbury
SCIOTO
Olentangy
Alum Cr.
Walnut Cr.
Westerville
COLUMBUS
Mt. Jefferson
London
Deer Cr.
Mt. Sterling
CIRCLEVILLE
Paint Cr.
Greenfield
Hillsboro
Frankfort
CHILLICOTHE
Salt Cr.
Waverly
Jackson
SCIOTO
PORTSMOUTH
OHIO R.
LEGEND
Average Coliform Results at Sampling Stations
Symbol
Most probable number per ml
○ Under 25
◔ 26–50
◑ 51–100
◕ 101–200
● Over 200

Fig. Sc-3

SCIOTO BASIN

COLIFORM RESULTS

10 0 10 20
SCALE OF MILES

OHIO RIVER POLLUTION SURVEY
U. S. PUBLIC HEALTH SERVICE
1941

Fig. Sc-4

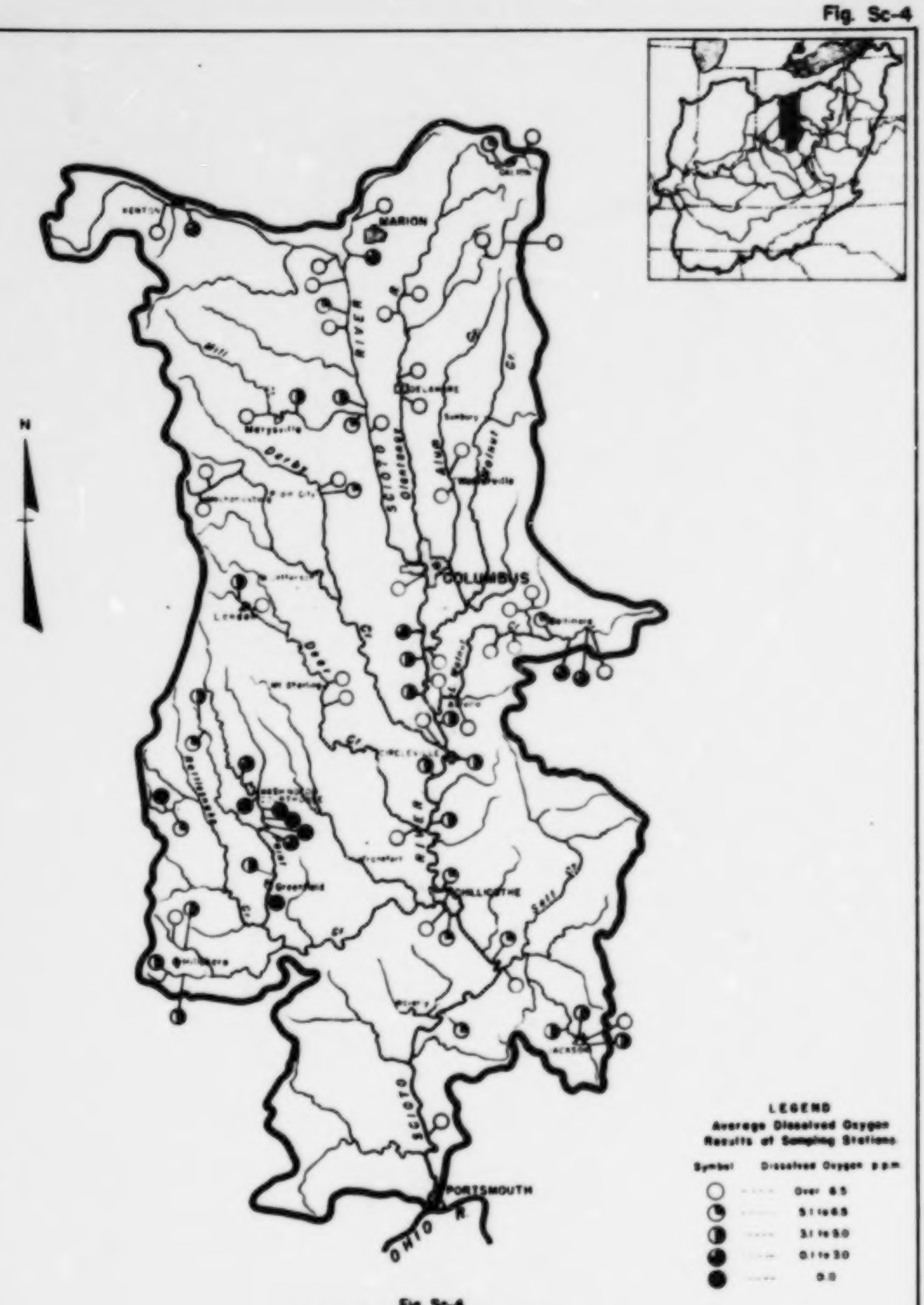

MARION
COLUMBUS
CHILLICOTHE
PORTSMOUTH
OHIO R.
SCIOTO RIVER
SCIOTO
RIVER
Olentangy
Alum
Walnut
Derby
Mill
Marysville
Delaware
Kenton
Sunbury
Westerville
London
Circleville
Greenfield
Hillsboro
Jackson
Salt Cr
N
LEGEND
Average Dissolved Oxygen
Results of Sampling Stations
Symbol
Dissolved Oxygen p.p.m.
○ Over 6.5
◔ 5.1 to 6.5
◑ 3.1 to 5.0
◕ 0.1 to 3.0
● 0.0

Fig. Sc-4

SCIOTO BASIN

DISSOLVED OXYGEN RESULTS

10 0 10 20
SCALE OF MILES

OHIO RIVER POLLUTION SURVEY
U.S. PUBLIC HEALTH SERVICE
1941

Fig. Sc-5

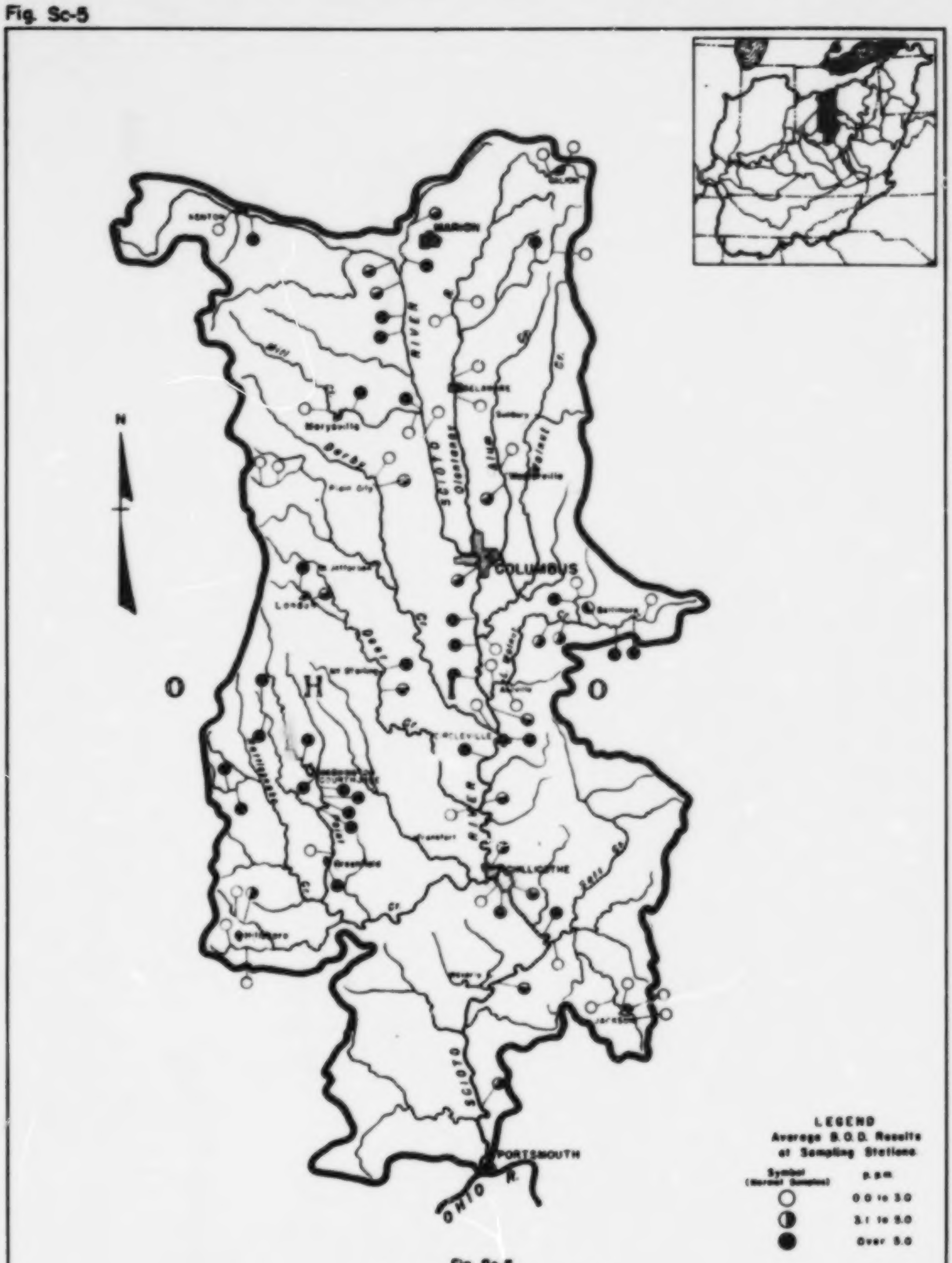

KENTON
MARION
GALION
RIVER
SCIOTO
Olentangy
Alum
Walnut
Mill
Darby
Marysville
Delaware
Sunbury
Westerville
Plain City
COLUMBUS
West Jefferson
London
Deer
Cr.
O
H
I
O
N
CIRCLEVILLE
Rattlesnake
Paint
Greenfield
Hillsboro
Frankfort
CHILLICOTHE
Salt Cr.
Waverly
Jackson
PORTSMOUTH
OHIO R.
LEGEND
Average B.O.D. Results
at Sampling Stations
Symbol
(Normal Samples)
p.p.m.
○ 0.0 to 3.0
◐ 3.1 to 5.0
● Over 5.0

Fig. Sc-5
SCIOTO BASIN
BIOCHEMICAL OXYGEN DEMAND

10 0 10 20
SCALE OF MILES

OHIO RIVER POLLUTION SURVEY
U. S. PUBLIC HEALTH SERVICE
1961

Hydrometric Data

Twenty-two stream gaging stations have been maintained on the Scioto River Basin for varying periods, 15 stations of which are in operation at the present time. Eight stations of importance from the pollution standpoint have been selected and the monthly mean summer flows for three years in which low summer flows have occurred are presented in Table Sc-6.

Figure Sc-6 presents a flow duration curve for the average monthly flows from June to September inclusive, for the period from 1921 to 1939, for the Scioto River at Columbus below the Columbus sewer outfall so that the flows include the sewage flow (average 70 c.f.s.). This curve indicates that average summer monthly flows of 190 c.f.s. or less have occurred every year. Flows of 115 c.f.s. may be expected every two years, 80 c.f.s. every five years and only the sewage flow of 71 c.f.s. every 10 years. The minimum average monthly summer flow was 66 c.f.s. The low average monthly flow of 60 c.f.s. shown on Table Sc-5 occurred during the winter.

Low-flow Regulation - The U. S. Engineer Department has determined three reservoir sites to be most nearly satisfactory for flood control and allied purposes, Delaware, Paint Creek and Rocky Fork. The Delaware Reservoir on Olentangy River above Columbus could be of value for flood control, water supply for the City of Delaware, and for pollution abatement, and would be capable of maintaining a minimum flow of 22 c.f.s. at the dam site. Under present plans, the Paint Creek and Rocky Fork Reservoirs are to be used solely for flood control. Seasonal low-flow control operations, if conducted at the Paint Creek and Rocky Fork Reservoirs in conjunction with flood-control operations, would result in minimum discharges of 51 c.f.s. and 13 c.f.s., respectively, at the dam sites.

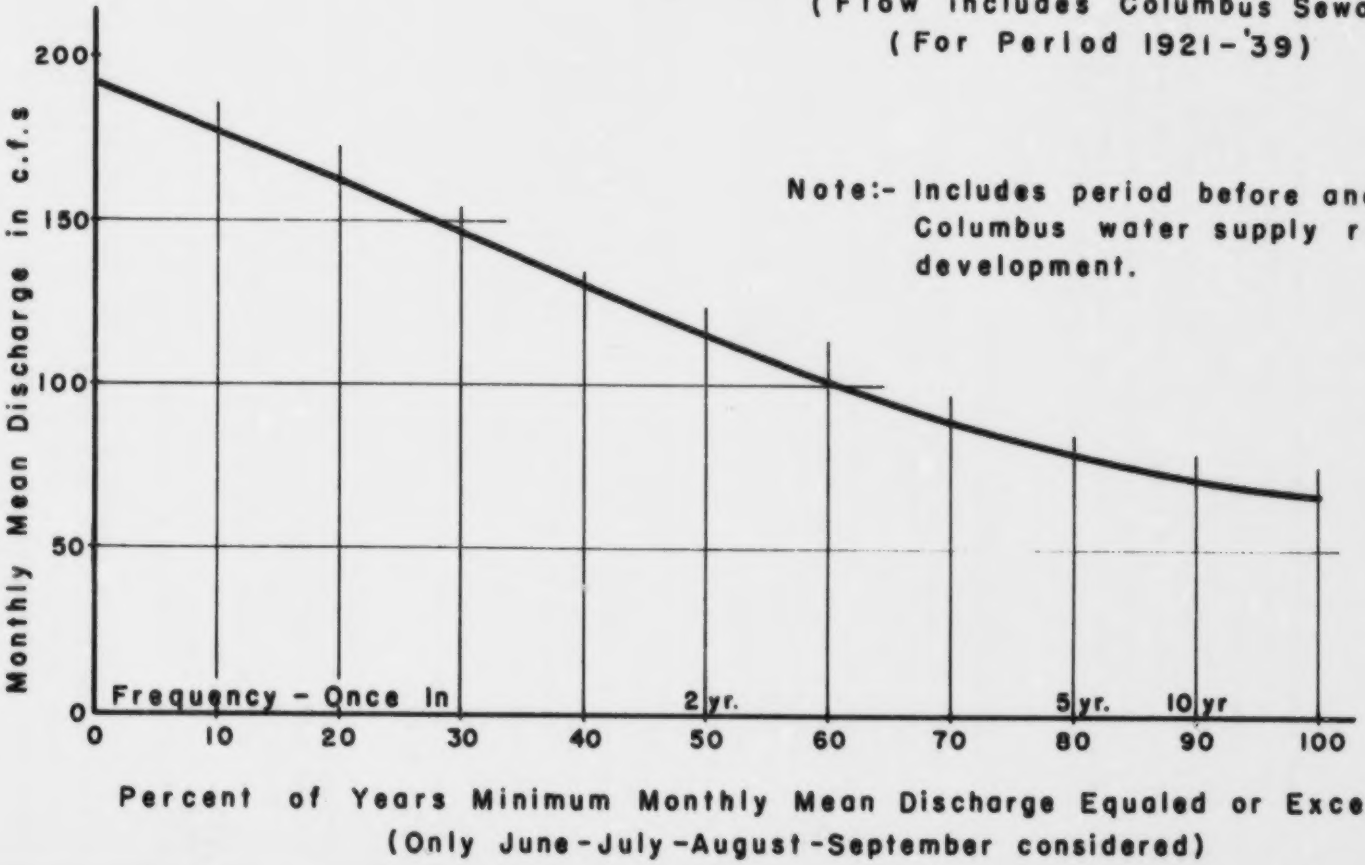
Table Sc-6 Scioto River Basin - Monthly Mean Summer Flows
for Years in Which Low Summer Flows have Occurred.

River Location	Scioto at Larue	Scioto at Columbus	Scioto at Chillicothe	Scioto at Higby
River Miles Above:				
Mouth of Scioto	192	132	69.6	55.7
Drain. Area Sq.Mi.	255	1,624	3,847	5,129
Period of Record	1925-40	1921-40	1921-40	1930-40
Year	1930	1921	1930	1932
June c.f.s.	36	283	470	1,980
July "	9	86	303	3,180
August "	6	96	*214	561
September "	17	67	233	406
Year	1932	1924	1932	1934
June "	38	3,780	976	718
July "	23	874	1,710	868
August "	*4.0	98	328	960
September "	7	66	252	387
Year	1934	1930	1934	1939
June "	41	178	435	5,450
July "	7	125	549	2,230
August "	12	82	565	822
September "	6	68	245	*337

River Location	L.Scioto near Marion	Olentangy near Delaware	Paint Cr. near Greenfield	Paint Cr. near Bourneville
River Miles Above:				
Conf.with Scioto	6	26	48	19.5
Mouth of Scioto	183	158	111.2	82.7
Drain.Area Sq.Mi.	81.2	387	251	808
Period of Record	1924-40	1922-34	1927-36	1924-40
Year	1930	1930	1930	1930
June c.f.s.	26	71	8	42
July "	3.6	10	.8	20
August "	1.2	1.8	*.5	*11
September "	2.8	11	.7	27
Year	1933	1933	1932	1936
June "	10	26	223	70
July "	7	29	295	29
August "	2.1	3.5	6	30
September "	2.2	26	1.4	22
Year	1934	1934	1934	1939
June "	1.6	22	7	441
July "	1.2	6	39	249
August "	1.3	.9	33	128
September "	*.7	*.5	10	15

* Minimum month.

FIGURE Sc-6
SUMMER LOW FLOW FREQUENCY CURVE
SCIOTO RIVER AT COLUMBUS, OHIO
(Flow includes Columbus Sewage)
(For Period 1921-'39)



Note:- Includes period before and after Columbus water supply reservoir development.

Discussion

Pollution problems of more than local significance exist on the main Scioto River below Columbus, on Paint Creek from Washington Court House to the confluence with the Scioto River at Chillicothe, and below Kenton on the upper Scioto, the only community of appreciable size without treatment facilities. Minor pollution problems, of local significance only, exist at various points below a number of moderate sized and small municipalities. Corrective measures at these points are included in the cost estimates but discussion has been omitted.

Main Scioto River below Columbus

The 132 miles of Scioto River between its mouth and the Olentangy River at Columbus receives wastes with a population equivalent of about 111,100. A large part of this is a residual pollution following treatment. Columbus, Circleville and Chillicothe contribute more than 95 percent of this pollution load. With the exception of Paint Creek, the six tributaries of appreciable size entering this section of the main stream are generally less polluted at their mouths than the main stream at the confluence.

Columbus - The recently completed activated sludge plant at Columbus treats practically all of the sewage and industrial wastes from the city and its suburbs. This plant, designed to maintain a minimum of 3 p.p.m. of dissolved oxygen in the river below Columbus, provides also for the treatment of storm water by diversion to storage tanks until treatment is possible during a subsequent period of lower sewage flow. Such a refinement in pollution abatement is rarely applied in the United States and Columbus has the only large installation of its kind in the Ohio Basin.

Despite this refinement, surface wash is of marked consequence. During the critical season, local showers may cause pollution from surface wash and overflow of storm water from certain combined sewers with little corresponding increase in dilution flow from above Columbus. The oxygen demand of this flush water may be sufficient. according to data of the Ohio Department of Health, to reduce the dissolved oxygen in the stream below the critical point.

During January 15, 1937 to August 15, 1939 the Scioto River below Columbus was studied by the Stream Pollution Investigations Station of the U. S. Public Health Service, to determine the effects on the stream of the completed sewage treatment plant at Columbus. Because of delays in placing the plant in full operation, this investigation was suspended and only limited data are available to indicate the effectiveness of treatment in improving river water quality during a critical low-flow period.

Stream discharge below Columbus includes the city sewage flow which amounts at present to about 70 c.f.s. Discharge records are available for the years 1921 to 1939 during which the city built a large water supply reservoir above Columbus which also influences the low flow of the Scioto. The flow data presented, therefore, are not strictly applicable to present conditions. They do indicate, however, that the treated sewage of Columbus is at times the only flow in the stream and that in most years there is at least one month when the dilution available is less than one volume. At Chillicothe and Higby the flow of the stream is much greater.

The selected laboratory results presented indicate conditions before the Columbus plant was in full operation and during a period of rather high flow. The minimum flow above Columbus during period of observations was 2,800 c.f.s., whereas in September, 1939 the flow was only 86 c.f.s. The results show that the stream was rather heavily polluted in spite of the high flows.

The City of Columbus has certainly taken every reasonable step possible toward the correction of its pollution problem. With initial operating difficulties overcome, it is probable that the accomplishment for which the works were designed, namely, an absolute minimum of 3 p.p.m. dissolved oxygen in the Scioto River below the plant, will be attained a very high percentage of the time. Possible exceptions will be at times of local rains.

Largely because of the effect of local rains, oxygen conditions below Columbus suitable to maintain fish life are possible only with an estimated minimum flow, in addition to the sewage effluent of 75 c.f.s. An estimated 22 c.f.s. can be maintained by the proposed Delaware flood-control reservoir on the Olentangy River above Columbus, but this is not sufficient to accomplish the desired result.

As the problem is one resulting from local rain, supplemental low flow is required for only a short period, possibly a matter of hours, but should be available on very short notice. This suggests less storage located near Columbus. The Whittier Street Dam forming the pool opposite Columbus might be used for this purpose. In case the storage is used in a matter of hours at the time of a local rain, the water could be replaced over a period of several days, if necessary, from the available 22 c.f.s. from the proposed Delaware reservoir.

The present construction of the Whittier Street Dam includes four 4-foot square outlets through the dam. Supplemental flow of 75 c.f.s. for a period of 12 hours may be obtained from the pool above the Whittier Street Dam by a draw-down of about 0.85 feet. There have been no great objections to past temporary lowering of this pool. A light lifting device for removing the stop logs will be necessary at an estimated cost of fifty dollars.

Circleville - Circleville has recently completed a chemical precipitation treatment plant that can, if desired, be divided into two parts, one to treat wastes from a large strawboard plant and the other to treat city sewage and all other industrial wastes. The Circleville plant was not in full operation during the period from January to July, 1939 when laboratory examinations of stream samples were being made. Principal pollution is from the strawboard wastes. Treatment of these wastes by chemical precipitation removes practically all of the settleable solids and a portion of the finer suspended solids. Elimination of shoals and sludge banks, therefore, may be expected. Oxygen demand reduction, however, is of minor consequence. Methods of correcting strawboard waste pollution are now being studied at several places. However, at the present time, the Circleville plant represents the only installation where even partial treatment is actually practiced. Lagooning has been temporarily effective at certain plants in the past.

Further treatment of sewage and wastes at Circleville appears desirable. However, secondary treatment of sewage would have but a very minor effect and no practical method for additional treatment has been developed for strawboard wastes. Further study of the strawboard waste problem appears indicated.

Despite limited treatment of waste and sewage at Circleville, quality of water below the city, because of higher flow, is superior to that below Columbus.

Chillicothe - Chillicothe has a primary treatment plant for all of its sewage. Certain industrial wastes, principally from paper plants, are discharged to Paint Creek. In the paper mills, recirculation is practiced to a limited extent and save-alls have been installed, both desirable pollution correction measures. The Federal Reformatory just north of Chillicothe has a primary treatment plant.

The sewage treatment plant effluents from Chillicothe and the Federal Reformatory above the city, plus industrial wastes which enter through Paint Creek, have some slight deleterious effect on the Scioto River. However, here again, because of higher flow, the quality of Scioto River water below the city is superior to that below Columbus. The slight effect on the Scioto as shown by the laboratory results would not justify further treatment.

Industrial pollution in Paint Creek between Chillicothe and the confluence with the Scioto River creates a serious condition. This pollution could be largely and justifiably corrected by discharging all but the paper mill wastes to public sewers for treatment in the municipal plant. The paper mill wastes are of such a volume that separate treatment is indicated. There are possibilities of further reduction of the paper mill wastes by recovery of by-products and reuse of water. Remaining wastes are capable of treatment by chemical precipitation.

Paint Creek

Wastes with a population equivalent of 18,900 enter Paint Creek and its tributaries above Chillicothe. The worst stream conditions, as shown by the laboratory results, are in the vicinity of Washington Court House and Greenfield, where zero oxygen conditions prevailed.

Paint Creek and its tributaries are important streams in a thriving agricultural district. Despite their condition, these streams are used for swimming and other recreational purposes. There appears ample justification for secondary treatment of sewage and wastes and this fact is generally recognized. Present primary treatment plants were installed as temporary expedients to be supplemented within a reasonable time with secondary treatment facilities.

Kenton

This is the only urban community in the Scioto River Basin without sewage treatment facilities. Its location above Columbus water supply reservoirs makes the provision of such facilities of more than local importance. Gross nuisance conditions prevail below the sewer outfalls during the summer months and laboratory results during September and October, 1939 showed only 1.7 p.p.m. of dissolved oxygen in the Scioto below town. Complete recovery was not apparent even 30 miles downstream. Secondary treatment appears justified for improvement of local conditions and protection of Columbus' water supply.

Miscellaneous Pollution

A number of other sources of wastes on the Scioto River and its tributaries cause serious pollution of primarily local significance. Remedial measures appear justified at Jackson, West Jefferson, Asheville and Baltimore. Some industrial waste correction is needed at most of these places, particularly along Little Walnut Creek.

Cost estimates for remedial measures for pollution abatement suggested, as justified by the stream uses, are summarized in Table Sc-1.

TABLE Sc-7 SCIOTO RIVER BASIN

OHIO RIVER POLLUTION SURVEY
LABORATORY DATA

SUMMARY OF AVERAGES

Sampling Point	Mileage from Mouth		Period 1939	Number of Samples	Average Discharge c.f.s.	Temp. °C	D.O. p.p.m.	5 Day B.O.D. p.p.m.	Coliform M.P.N. Per ml.	pH	Turbidity p.p.m.	Alkalinity p.p.m.	Hardness p.p.m.
Scioto River - Above Kenton, Ohio	Sc	209.5	Sept. & Oct.	3	2	15.5	8.6	2.0	24	8.0	47	236	225
Scioto River - Below Kenton, Ohio	Sc	208	"	3	2	16.8	1.7	7.5	7,410	7.7	8	315	369
Scioto River-Above Greencamp, Ohio	Sc	179.5	"	1		17.0	5.3	4.4	23	7.9	29	231	
Little Scioto R.-Above Marion, Ohio	ScLs	184.5	"	3	1	16.0	10.0	3.7	26	8.3	18	143	190
Little Scioto R.-Below Marion, Ohio	ScLs	179	"	3	1	15.7	1.8	13.5	34,600	7.5	25	274	185
Scioto R.- 1 mi. below Greencamp, Ohio	Sc	175.5	"	1		17.0	6.7	4.7	23	7.9	8	258	
Scioto River - Above Prospect, Ohio	Sc	172	"	1		17.0	5.2	11.3	7	8.0	32	200	
Scioto River - 1 mile Below Prospect, Ohio	Sc	170	"	1		18.0	10.4	15.9	110	8.6	15	191	
Scioto River-Above Mouth Mill Creek Bellepoint, Ohio	Sc	156	"	1		19.5	4.6	6.6	9	7.8	56	233	
Mill Creek - Above Marysville, Ohio	ScM	172	"	4		15.1	7.3	3.0	6	7.9	40	192	129
Mill Creek - Below Marysville, Ohio	ScM	166	"	4		17.8	4.3	7.2	7,250	7.7	23	227	191
Mill Creek At Mouth	ScM	156	"	1		19.0	6.5	0.8	15	7.7	15	214	
Scioto River-upper end Columbus Reservoir	Sc	151.5	Sept. & Oct.	1		20.5	6.9	2.6	9	7.5	45	190	
Olentangy R. - 1 mile above Galion, Ohio	ScO	213	"	2	1	11.5	7.8	2.7	15	7.6	43	97	125
Olentangy R. - 1½ miles Below Galion, Ohio	ScO	211	"	2	1	10.3	6.5	2.8	59	7.8	14	199	136
Olentangy River-Above Waldo, Ohio	ScO	174	"	1	**	18.5	7.0	1.9	9	7.7	15	235	
Olentangy River-Below Waldo, Ohio	ScO	173	"	1	**	19.0	8.6	1.8	43	7.8	13	288	
Whetstone Creek-Above Mt. Gilead, Ohio	ScOW	187	"	3	**	15.3	8.8	1.9	16	7.8	10	290	
Whetstone Creek-Below Mt. Gilead, Ohio	ScOW	185	"	2	**	14.5	9.3	6.7	235	8.1	18	231	
Olentangy River Above Delaware, Ohio	ScO	159	"	2	12	17.5	8.5	3.0	12	8.0	16	183	137
Olentangy R.Central St Bridge, Delaware, O.	ScO	158	"	1	8	13.5	9.0	1.7	24	7.9	15	204	
Olentangy R.-Winter St Bridge-Delaware, Ohio	ScO	158	"	1	8	14.5	9.5	1.6	9	8.0	15	208	
Olentangy R.-Williams St.Br.-Delaware, Ohio	ScO	158	"	1	8	15.0	9.3	1.4	24	8.0	15	201	
Olentangy R. - Below Delaware, Ohio	ScO	157	"	2	12	18.5	10.8	2.8	26	8.6	5	202	153
Scioto River, Station 127.5, Columbus, Ohio	Sc	129.3	Jan.	16	646	3.4	12.7	1.7	82	8.1		179	
" "	"	"	Feb.	16	3,055	3.6	13.5	2.4	248	7.7		116	
" "	"	"	Mar.	17	5,068	6.3	12.6	2.1	115	7.6		109	
" "	"	"	April	17	3,464	9.5	11.6	1.8	45	7.7		124	
" "	"	"	May	12	392	19.0	9.1	2.0	52	8.2		160	
" "	"	"	June	17	2,680	23.7	7.1	3.4	977	7.9		146	
" "	"	"	July	12	931	23.9	7.3	1.6	91	7.8		146	
Scioto River, Station 117.5, Shadeville, Ohio	Sc	119.8	Jan.	16	677	4.3	5.4	16.3	8,160	7.5		200	
" "	"	"	Feb.	16	3,194	3.8	12.5	5.3	1,620	7.6		131	
" "	"	"	Mar.	17	5,386	6.4	11.3	3.9	1,240	7.6		119	
" "	"	"	April	17	3,646	9.4	10.0	4.0	1,490	7.7		136	
" "	"	"	May	12	410	18.4	2.7	4.6	2,140	7.6		192	
" "	"	"	June	17	2,804	23.1	3.0	4.6	5,390	7.6		162	
" "	"	"	July	12	974	23.7	4.2	3.1	2,200	7.6		194	

TABLE Sc-7 SCIOTO RIVER BASIN

OHIO RIVER POLLUTION SURVEY
LABORATORY DATA

SUMMARY OF AVERAGES

Sampling Point	Mileage From Mouth		Period 1939	Number of Samples	Average Discharge c.f.s.	Temp. °C	D.O. p.p.m.	5 Day B.O.D. p.p.m.	Coliforms M.P.N. Per ml.	pH	Turbidity p.p.m.	Alkalinity p.p.m.	Hardness p.p.m.
Alum Creek - Above Westerville, Ohio	ScBwA	152	Sept. & Oct.	1	3	12.0	7.4	1.7	9	7.9	10	223	190
Alum Creek - Below Westerville, Ohio	ScBwA	151	"	1	3	11.0	8.5	3.5	23	8.1	3	176	176
Big Walnut Creek At Mouth	ScBw	117	Jan.	4		3.2	12.3	0.9	6	7.8		198	
" "	"	"	Feb.	4		3.4	12.6	2.7	90	7.6		112	
" "	"	"	Mar.	5		6.4	11.6	1.5	119	7.6		128	
" "	"	"	April	4		10.2	10.1	1.6	77	7.6		186	
" "	"	"	May	1		12.5	10.1	0.9	4	7.9		194	
Scioto River, Station 115, Commercial Point, O.	Sc	115	Jan.	16	845	5.1	6.7	8.6	2,350	7.6		201	
" "	"	"	Feb.	16	4,605	4.0	12.4	4.8	756	7.6		127	
" "	"	"	Mar.	17	6,098	6.8	10.9	4.0	885	7.6		123	
" "	"	"	April	17	5,478	9.8	9.9	3.5	1,020	7.6		132	
" "	"	"	May	12	663	19.7	4.2	4.7	655	7.6		201	
" "	"	"	June	17	3,367	24.0	3.8	3.2	1,320	7.6		164	
" "	"	"	July	12	1,290	24.3	5.0	2.8	733	7.6		161	
Scioto River, Station 107.5, South Bloomfield, Ohio	Sc	109	Jan.	16	858	5.2	5.9	7.3	375	7.6		203	
" "	"	"	Feb.	16	4,746	3.9	12.2	5.1	620	7.6		129	
" "	"	"	Mar.	17	6,155	6.9	10.8	3.6	1,020	7.6		128	
" "	"	"	April	17	5,592	9.8	9.7	3.6	1,230	7.6		133	
" "	"	"	May	12	680	19.8	4.5	4.8	501	7.6		201	
" "	"	"	June	17	3,408	24.1	3.9	3.3	838	7.6		164	
" "	"	"	July	12	1,311	24.2	5.1	2.5	663	7.6		165	
Little Walnut Cr.- 1 mi.above Baltimore	ScW	147	Oct. & Nov.	3	2	8.2	7.4	2.0	18	7.6	8	238	375
L.Walnut Cr.-½ mi.Bel. PawPaw Cr.-Baltimore	ScW	145	"	3	2	9.8	0.5	87.7	2,730	7.4	67	345	389
L.Walnut Cr.-3½ mi.Bel. PawPaw Cr.Bel.Basil,O	ScW	141.5	"	2		7.3	1.5	17.4	483	7.3	22	333	383
L.Walnut Cr.-½ mi. N.W.Lockville, Ohio	ScW	134	"	2		7.5	5.1	4.4	9	7.5	13	283	377
Sycamore Cr.-1½ miles Abv.Pickerington, Ohio	ScWSy	139	"	3	2	11.3	9.3	1.6	6	7.7	34	238	610
Sycamore Cr.-3/4 mi. Bel.Pickerington, Ohio	ScWSy	137	"	3	2	12.0	6.8	8.3	182	7.6	29	283	758
Little Walnut Cr.-½ mi abv. Canal Winchester	ScW	130.5	Oct. & Nov.	1	9	14.0	8.7	3.3	4	7.9	18	307	
L.Walnut Cr.- 1/8 mi. Abv. Canal Winchester	ScW	130.1	"	2	20	10.0	10.0	2.8	8	7.6	28	259	630
L.Walnut Cr.- ½ mile Bel. Canal Winchester	ScW	129.5	"	3	17	11.3	9.1	3.2	283	7.6	25	285	626
L.Walnut Cr.- 1 mile Above Ashville, Ohio	ScW	110.5	"	3	40	10.2	7.4	2.1	5	7.7	30	270	439
L.Walnut Cr.- 1 mile Below Ashville, Ohio	ScW	109	"	3	40	10.5	7.0	2.9	101	7.6	29	280	443
Scioto River, Station 100.5, [illegible]	Sc	101.8	Jan.	16	957	4.5	8.1	4.0	219	7.6		206	
" "	"	"	Feb.	16	5,534	4.1	11.9	4.3	820	7.6		134	
" "	"	"	Mar.	17	6,662	6.9	10.7	3.4	720	7.6		133	
" "	"	"	April	17	6,583	9.9	9.6	3.4	498	7.6		137	
" "	"	"	May	12	816	19.5	5.9	3.2	164	7.7		208	
" "	"	"	June	17	3,744	24.0	4.4	3.2	592	7.6		165	
" "	"	"	July	12	1,492	24.3	5.4	2.1	463	7.7		169	
Big Darby Creek Above Plain City, O.	ScD	151	Sept. & Oct.	2	3	12.0	8.1	2.6	35	8.1	41	244	127
Big Darby Creek Below Plain City, Ohio	ScD	150	"	2	3	11.8	6.5	3.1	142	7.9	9	250	133

TABLE Sc-7 SCIOTO RIVER BASIN

OHIO RIVER POLLUTION SURVEY
LABORATORY DATA

SUMMARY OF AVERAGES

Sampling Point	Mileage From Mouth	Period 1939	Number of Samples	Average Discharge c.f.s.	Temp. °C	D.O. p.p.m.	5 Day B.O.D. p.p.m.	Coliform M.P.N. Per ml.	pH	Turbidity p.p.m.	Alkalinity p.p.m.	Hardness p.p.m.
Little Darby Creek Abv. Mechanicsburg, O.	ScD1 174	Sept. & Oct.	2	**	11.5	9.2	1.5	31	7.9	10	49	151
L. Darby Creek - Below Mechanicsburg, Ohio	ScD1 172	"	2	**	11.6	9.8	1.8	277	7.9	13	53	153
Darby Creek At Mouth	ScD 100.5	Jan.	4		3.1	13.1	1.3	31	8.1		254	
" "	" "	Feb.	4		3.5	12.3	1.3	63	7.8		202	
" "	" "	Mar.	5		6.8	11.9	1.3	75	7.9		202	
" "	" "	April	4		10.4	10.6	1.3	51	8.0		205	
" "	" "	May	1		13.0	10.8	1.0	4	8.3		[illegible]	
Scioto River Station 99.5 Circleville, Ohio	Sc 99.5	Jan.	16	1,133	3.8	9.1	3.0	215	7.7		218	
" "	" "	Feb.	16	6,962	3.4	12.8	2.6	504	7.6		141	
" "	" "	Mar.	17	7,558	6.1	10.6	3.6	522	7.6		140	
" "	" "	April	17	8,362	9.4	9.7	2.6	467	7.7		140	
" "	" "	May	12	1,058	18.7	6.3	1.9	198	7.7		216	
" "	" "	June	17	4,360	23.6	4.6	2.7	347	7.6		172	
" "	" "	July	12	1,811	24.1	5.8	7.6	297	7.7		177	
Scioto R.-Sta. 95.5 Pa. R.R. Bridge	Sc 95.5	Jan.	16	1,134	4.7	9.1	6.9	632	7.7		218	
" "	" "	Feb.	16	6,968	4.2	11.9	3.9	1,480	7.6		147	
" "	" "	Mar.	17	7,562	7.4	10.7	4.4	442	7.6		147	
" "	" "	April	17	8,372	10.0	9.7	3.8	527	7.7		149	
" "	" "	May	12	1,060	19.8	6.2	5.7	272	7.7		221	
" "	" "	June	17	4,362	24.0	4.6	4.6	948	7.7		178	
" "	" "	July	12	1,812	24.6	5.3	4.3	794	7.7		184	
Scioto R.-Sta. 86.5 Kellenberger's Bridge	Sc 86.2	Jan.	12	1,457	4.7	8.4	4.4	241	7.7		218	
" "	" "	Feb.	8	7,789	5.1	11.5	2.9	408	7.6		147	
" "	" "	Mar.	8	8,299	7.4	10.1	3.8	528	7.7		148	
" "	" "	April	7	6,863	10.4	9.7	3.2	269	7.7		154	
" "	" "	May	7	1,183	19.2	5.9	4.3	121	7.7		228	
" "	" "	June	11	3,174	24.2	4.1	3.3	372	7.7		186	
" "	" "	July	7	1,513	24.2	4.5	3.0	331	7.7		186	
Oak Creek - Above London, Ohio	ScDD 142	Sept.	1	1	20.0	4.5	6.3	190	8.0			
" "	" "	Oct.	1	**	17.5	8.5	2.4	4	7.9			
" "	" "	Nov.	1	1	5.0	10.9	1.8	46	7.8			
" "	" "	Dec.	1		3.0	12.3	1.8	**	7.8			
" "	" "	Jan. '40	1		0.0	13.3	1.3	46				
Oak Creek - Below London, Ohio	ScDD 140	Sept.	1	1	20.0	6.2	2.9	430	7.9			
" "	" "	Oct.	1	**	17.5	7.6	2.9	36	7.9			
" "	" "	Nov.	1	1	4.5	11.3	1.7	93	7.7			
" "	" "	Dec.	1		1.0	12.3	1.3	43	7.8			
" "	" "	Jan. '40	1		0.0	12.1	3.4	1,100				

TABLE Sc-7 SCIOTO RIVER BASIN

OHIO RIVER POLLUTION SURVEY
LABORATORY DATA

SUMMARY OF AVERAGES

Sampling Point	Mileage from Mouth	Period 1939	Number of Samples	Average Discharge c.f.s.	Temp. °C	D.O. p.p.m.	5 Day B.O.D. p.p.m.	Coliform M.P.N. Per ml.	pH	Turbidity p.p.m.	Alkalinity p.p.m.	Hardness p.p.m.
Deer Creek - Above Mt. Sterling, Ohio	ScDe 119	Sept.	1	9	22.5	8.4	1.6	24	8.1			
" "	" "	Oct.	1	6	16.5	9.2	1.9	8	8.2			
" "	" "	Nov.	1	11	6.0	11.0	1.0	15	8.0			
" "	" "	Dec.	1		2.0	12.8	1.1	9	7.9			
" "	" "	Jan. '40	1		1.0	13.1	5.2	460				
Deer Creek - Below Mt. Sterling, Ohio	ScDe 116	Sept.	1	9	22.5	8.1	1.9	93	8.1			
" "	" "	Oct.	1	6	19.0	6.8	2.2	4	8.2			
" "	" "	Nov.	1	11	6.0	11.2	1.0	23	7.9			
Deer Creek - Below Mt. Sterling, Ohio	" "	Dec.	1		2.0	12.6	0.8	4	8.0			
" "	" "	Jan. '40	2		0.0	12.2	3.6	143	7.5			
Deer Creek At Mouth	ScDe 84.8	Jan.	4		3.2	13.0	1.0	3	8.1		251	
"	" "	Feb.	4		4.0	11.7	1.3	58	7.8		188	
"	" "	Mar.	5		6.6	11.8	1.2	125	7.9		212	
" "	" "	April	4		9.4	10.5	1.5	42	8.0		206	
"	" "	May	1		10.0	10.3	1.1	4	8.3		242	
Scioto River Chillicothe, Ohio	Sc 70	Jan.	9	2,770	4.9	9.7	4.7	1,350	7.7		206	
" "	" "	Feb.	7	12,920	3.9	11.9	3.7	756	7.6		124	
" "	" "	Mar.	9	9,944	7.8	10.6	3.4	237	7.7		148	
" "	" "	April	8	10,174	11.2	9.5	2.8	216	7.7		153	
" "	" "	May	5	1,431	17.9	8.5	3.8	58	7.8		219	
" "	" "	June	9	6,163	24.6	5.9	2.9	198	7.7		180	
" "	" "	July	5	2,237	23.8	6.3	2.8	241	7.8		194	
Scioto River Kilgore Bridge	Sc 64.3	Jan.	9	2,784	5.4	10.1	4.4	202	7.7		214	
" "	" "	Feb.	7	12,986	4.1	11.9	3.9	510	7.6		135	
" "	" "	Mar.	9	9,580	7.9	10.5	3.2	323	7.7		152	
" "	" "	April	8	10,220	11.2	9.5	2.4	224	7.7		158	
" "	" "	May	5	1,436	17.7	9.2	3.6	96	8.0		229	
" "	" "	June	9	6,192	24.9	6.2	2.8	264	7.8		182	
" "	" "	July	5	2,247	23.8	6.5	2.4	295	7.8		199	
Paint Creek - Above Washington Court House	ScP 132	July	1		26.0	7.3	1.4	150				
" "	" "	Sept.	1		20.0	0.4	7.8	150,000	7.6			
" "	" "	Oct.	2		11.3	3.6	3.3	295	7.6			
" "	" "	Dec.	1		6.0	10.2	2.8	36	7.8			
" "	" "	Jan. '40	2		0.0	7.7	1.5	14	7.5			
" "	" "	Feb. "	5		1.9	11.5	1.8	88	7.7			
" "	" "	Mar. "	4		4.8	12.3	1.0	205	7.8			
" "	" "	April	1		14.0	9.4	3.0	9	8.0			

TABLE Sc-7 SCIOTO RIVER BASIN

OHIO RIVER POLLUTION SURVEY
LABORATORY DATA

SUMMARY OF AVERAGES

Sampling Point	Mileage from Mouth		Period 1939	Number of Samples	Average Discharge c.f.s.	Temp. °C	D.O. p.p.m.	5 Day B.O.D. p.p.m.	Coliform M.P.N. Per ml	pH	Turbidity p.p.m.	Alkalinity p.p.m.	Hardness p.p.m.
Paint Creek-Point #1 Bel.Washington C.H.,O.	ScP	127.5	July	1		25.0	0.0	19.2	29,000				
" "	"	"	Sept.	1	3	19.0	0.0	152.6	290,000	7.2			
" "	"	"	Oct.	2	4	11.8	0.0	278.0	670,000	7.1			
" "	"	"	Dec.	1		7.0	0.0	189.0	91,000	7.3			
" "	"	"	Jan. '40	1		1.0	0.0	212.5	75,000				
Paint Creek-Point #2 Bel.Washington C.H.,O.	ScP	126	Sept.	1		18.0	0.0	71.4	110,000	7.2			
" "	"	"	Oct.	2		9.0	0.0	180.0	160,000	7.5			
" "	"	"	Dec.	1		4.5	0.0	265.0	23,000	7.4			
" "	"	"	Jan. '40	2		0.0	3.9	74.5	121,000	7.5			
" "	"	"	Feb. "	5		2.6	10.6	10.9	1,100	7.7			
" "	"	"	Mar. "	4		5.8	11.7	4.6	209	7.8			
" "	"	"	April"	1		14.5	8.2	2.5	150	8.0			
Paint Creek-Point #3 Bel.Washington C.H.,O.	ScP	124.5	Sept.	1		20.0	0.0	81.2	46,000	7.6			
" "	"	"	Oct.	2		10.3	0.0	124.0	33,900	7.4			
" "	"	"	Dec.	1		4.5	0.0	172.5	4,300	7.4			
" "	"	"	Jan. '40	1		0.0	0.0	135.5	46,000				
Paint Creek-Point #4 Bel.Washington C.H.,O.	ScP	123.5	Sept.	2		20.3	10.4	9.0	23	8.2			
" "	"	"	Oct.	2		10.8	2.4	63.3	55,000	7.8			
" "	"	"	Dec.	1		5.0	7.4	14.7	3,600	7.8			
" "	"	"	Jan. '40	1		0.0	0.0	67.0	4,300				
Paint Creek-Point #5 Bel.Washington C.H.,O.	ScP	122.5	Sept.	1		21.0	6.1	4.3	4	8.1			
" "	"	"	Oct.	2		12.0	2.1	97.5	1,200	7.9			
" "	"	"	Dec.	1		5.0	8.0	5.6	360	7.9			
" "	"	"	Jan. '40	2		0.0	1.5	52.7	1,900	7.5			
" "	"	"	Feb. "	5		1.2	9.5	7.1	2,470	7.6			
" "	"	"	Mar. "	4		4.8	11.3	2.0	268	7.7			
" "	"	"	Apr. "	1		14.0	7.1	2.6	240	7.8			
Paint Creek-Point #6 Bel.Washington C.H.,O.	ScP	121.5	Sept.	1		22.5	7.5	2.4	2	7.9			
Sugar Creek - Above Jeffersonville, Ohio	ScPS	148	Aug.	1	1	24.5	3.4	2.8	240				
" "	"	"	Oct.	1	1	15.5	4.4	13.5	150	8.0			
Sugar Creek - Below Jeffersonville, Ohio	ScPS	147	Aug.	1	1	25.5	5.4	7.9	460				
" "	"	"	Oct.	1	1	14.5	5.6	8.1	930	8.0			
" "	"	"	Nov.	1	1	17.0	6.5	6.5	230	7.5			
" "	"	"	Dec.	1	1	2.5	11.1	7.2	93	7.8			
" "	"	"	Jan. '40	1		0.0	1.1	38.0	93	7.6			
Paint Creek - Above Greenfield, Ohio	ScP	112.0	Sept.	1	4	24.0	4.8	2.1	24	7.9			
" "	"	"	Oct.	1	2	17.0	4.6	2.5	23	7.6			
" "	"	"	Nov.	1	9	5.5	9.8	1.7	9	7.8			
" "	"	"	Dec.	1		7.0	10.6	2.4	2	8.0			
" "	"	"	Jan. '40	1		0.0	9.4	2.5	36	7.5			

TABLE Sc-7 SCIOTO RIVER BASIN

OHIO RIVER POLLUTION SURVEY
LABORATORY DATA

SUMMARY OF AVERAGES

Sampling Point	Mileage from Mouth		Period 1939	Number of Samples	Average Discharge c.f.s.	Temp. °C	D.O. p.p.m.	5 Day B.O.D. p.p.m.	Coliform M.P.N. Per ml.	pH	Turbidity p.p.m.	Alkalinity p.p.m.	Hardness p.p.m.
Paint Creek - Above Greenfield, Ohio	ScP	112.0	Feb. '40	5		2.8	12.2	2.4	213	7.7			
" "	"	"	Mar. "	4		6.3	12.4	1.1	79	7.9			
" "	"	"	Apr. "	1		15.0	11.2	1.4	4	8.1			
Paint Creek - Below Greenfield, Ohio	ScP	105.4	Sept.	1		22.0	6.4	6.0	240	7.8			
" "	"	"	Oct.	1		17.0	0.0	19.5	24,000	7.6			
" "	"	"	Nov.	1		7.5	1.4	27.9	9,300	7.6			
" "	"	"	Dec.	1		8.5	6.3	6.8	1,500	7.8			
" "	"	"	Jan. '40	1		0.0	12.5	3.2	2,400	7.7			
" "	"	"	Feb. "	5		2.5	13.1	3.2	1,020	7.8			
" "	"	"	Mar. "	4		5.9	12.7	1.7	903	7.9			
" "	"	"	Apr. "	1		14.5	11.4	2.8	430	8.2			
Wilson Creek - Above Sabina, Ohio	ScPRW	137	July	1	7	26.5	6.5	1.7	43				
" "	"	"	Sept.	1	**	16.5	0.0	27.8	2,400				
" "	"	"	Oct.	2	**	9.0	6.6	10.8	23,400	7.7			
" "	"	"	Dec.	1		3.5	11.0	1.6	91				
" "	"	"	Jan. '40	1		0.0	1.6	57.3	11,000				
Wilson Creek - Below Sabina, Ohio	ScPRW	136	July	1	7	27.5	12.8	2.3	91				
" "	"	"	Sept.	1	**	17.0	5.7	6.2	1,100				
" "	"	"	Oct.	2	**	9.0	9.1	8.6	580	8.1			
" "	"	"	Dec.	1		2.0	11.0	4.1	36				
Rocky Fork Creek-Above Hillsboro, Ohio	ScPRo	122	Aug.	1		27.0	9.9	0.7	46	8.1			
" "	"	"	Sept.	1		20.0	6.6	0.8	15	7.9			
" "	"	"	Oct.	1		16.0	7.8	1.2	24	7.9			
" "	"	"	Nov.	1		4.5	9.4	1.0	110	8.0			
" "	"	"	Dec.	1		7.5	10.8	0.5	4	7.8			
" "	"	"	Jan. '40	1		0.0	12.5	0.9	24	7.6			
Rocky Fork Creek-Below Hillsboro, Ohio	ScPRo	119.5	Aug. '39	1		24.5	7.0	0.6	75	7.9			
" "	"	"	Sept.	1		20.0	7.1	2.4	9	7.9			
" "	"	"	Oct.	1		17.5	4.2	2.3	46	7.5			
" "	"	"	Nov.	1		5.5	11.0	1.0	8	7.8			
" "	"	"	Dec.	1		6.5	10.4	0.6	1	7.8			
" "	"	"	Jan. '40	1		0.0	10.9	0.5	24	7.6			
Clear Creek - Above Hillsboro, Ohio	ScPRoC	122	Aug.	1		25.0	8.0	1.5	9	8.0			
" "	"	"	Sept.	1		20.0	3.9	0.5	110	7.7			
" "	"	"	Oct.	1		16.0	6.7	1.3	4	7.9			
" "	"	"	Nov	1		5.0	11.9	1.2	15	7.9			
" "	"	"	Dec.	1		7.0	11.2	0.7	1	7.8			
" "	"	"	Jan. '40	1		0.0	12.4	0.7	1	7.5			
Clear Creek - Below Hillsboro, Ohio	ScPRoC	120	Aug.	1	1	24.0	7.0	0.6	460	8.0			
" "	"	"	Sept.	1	1	20.0	4.1	1.8	9	7.5			
" "	"	"	Oct.	1	**	15.5	4.0	2.0	9	7.5			

TABLE Sc-7 SCIOTO RIVER BASIN

OHIO RIVER POLLUTION SURVEY
LABORATORY DATA

SUMMARY OF AVERAGES

Sampling Point	Mileage from Mouth		Period 1939	Number of Samples	Average Discharge c.f.s.	Temp. °C	D.O. p.p.m.	5 Day B.O.D. p.p.m.	Coliform M.P.N. Per ml.	pH	Turbidity p.p.m.	Alkalinity p.p.m.	Hardness p.p.m.
Clear Creek - Below Hillsboro, Ohio	ScPRoC	120	Nov.	1	1	5.5	10.9	1.2	110	7.7			
" "	"	"	Dec.	1		8.0	9.3	1.5	9	7.6			
" "	"	"	Jan. '40	1		0.0	9.6	3.7	240	7.5			
Paint Creek Station F-1 Chillicothe, Ohio	ScP	66.6	Mar.	6		7.8	11.2	1.0	45	7.9		207	
" "	"	"	Apr.	8		9.9	10.3	1.4	75	7.8		192	
" "	"	"	May	5		15.2	9.1	1.2	4	8.1		233	
" "	"	"	June	9		23.2	7.0	2.0	428	8.0		202	
" "	"	"	July	5		23.0	7.3	1.1	39	8.0		200	
Paint Cr.-Station F Chillicothe, Ohio	ScP	64.5	Jan.	8		5.6	12.0	9.7	85	8.0		221	
" "	"	"	Feb.	7		4.1	12.2	3.7	168	7.6		141	
" "	"	"	Mar.	9		8.3	10.8	3.4	53	7.9		197	
" "	"	"	April	8		10.9	10.3	3.2	87	7.8		186	
" "	"	"	May	5		16.0	8.1	7.6	17	8.2		243	
" "	"	"	June	9		25.2	6.1	9.3	229	8.1		214	
" "	"	"	July	5		24.0	5.7	13.3	156	8.2		214	
Scioto River Higby, Ohio	Sc	55.7	Jan.	9	4,162	5.3	10.5	5.3	515	7.7		213	
" "	"	"	Feb.	7	19,386	3.9	12.0	3.5	316	7.6		138	
" "	"	"	Mar.	9	11,840	8.1	10.5	3.2	306	7.7		158	
" "	"	"	April	8	15,195	11.2	9.6	2.6	212	7.7		161	
" "	"	"	May	5	2,374	17.5	8.3	3.9	405	8.0		232	
" "	"	"	June	9	6,969	24.5	5.3	2.8	429	7.8		190	
" "	"	"	July	5	2,568	24.0	5.9	2.8	427	7.9		197	
Little Salt Cr.-1 mi. Above Jackson, Ohio	ScSL	76	July	2			4.1	2.2	33				
Little Salt Cr.-upper edge Jackson, Ohio	ScSL	75	July	2			7.9	2.2	70				
Little Salt Cr.-lower end of Jackson, Ohio	ScSL	74	July	2			3.8	2.2	195				
Little Salt Cr.-3½ mi. below Jackson, Ohio	ScSL	72	July	2			3.6	2.0	17				
Salt Creek At Mouth	ScS	51.4	Jan.	5		5.2	12.5	1.1	64	7.2		48	
" "	"	"	Feb.	3		5.5	11.9	1.3	125	7.2		45	
" "	"	"	Mar.	5		7.4	11.5	1.2	43	7.2		94	
" "	"	"	April	4		10.6	10.7	0.8	50	7.2		58	
" "	"	"	May	1		13.0	10.2	0.9	15	7.5		96	
" "	"	"	June	1		24.0	6.9	1.2	46	7.7		144	
Scioto River Waverly, Ohio	Sc	38.7	Jan.	9	4,689	5.2	11.0	3.5	208	7.7		187	
" "	"	"	Feb.	7	21,730	4.0	11.9	2.9	248	7.6		128	
" "	"	"	Mar.	9	13,872	8.1	10.4	2.6	249	7.6		151	
" "	"	"	April	7	11,281	11.1	9.5	2.0	152	7.7		159	
" "	"	"	May	5	2,684	17.4	8.7	3.0	38	8.0		226	
" "	"	"	June	9	7,820	24.4	5.8	2.5	136	7.7		183	
" "	"	"	July	5	2,880	23.9	6.5	2.0	120	7.9		194	

TABLE Sc-7 SCIOTO RIVER BASIN

OHIO RIVER POLLUTION SURVEY
LABORATORY DATA

SUMMARY OF AVERAGES

Sampling Point	Mileage From Mouth	Period 1939	Number of Samples	Average Discharge c.f.s.	Temp. °C	D.O. p.p.m.	5 Day B.O.D. p.p.m.	Coliform M.P.N. Per ml.	pH	Turbidity p.p.m.	Alkalinity p.p.m.	Hardness p.p.m.
Scioto River Lucasville, Ohio	Sc 15.5	Jan.	9	5,037	4.7	11.5	2.5	200	7.7		173	
" "	" "	Feb.	7	23,343	3.6	11.9	2.6	333	7.6		117	
" "	" "	Mar.	9	14,244	7.7	10.5	2.1	129	7.6		145	
" "	" "	April	7	12,043	10.9	9.5	1.5	64	7.7		155	
" "	" "	May	5	2,858	17.0	8.9	2.4	25	8.0		226	
" "	" "	June	9	8,390	24.3	6.5	2.2	63	7.8		184	
" "	" "	July	5	3,092	23.7	7.2	1.9	8	7.9		194	
" "	" "	Sept.	5	458	21.7	7.6	3.0	3	8.0	28	222	
" "	" "	Oct.	4	349	15.4	8.2	2.7	3	8.0	24	267	
" "	" "	Nov.	5	571	7.2	10.0	1.8	6	7.9	18	229	
" "	" "	Dec.	3	610	6.2	10.2	1.9	2	7.8	10	229	
" "	" "	Jan. '40	1	405	8.5	10.4	3.7	9	7.6	7	271	

** Less than one

MIAMI RIVER BASIN

Final Report to the Ohio River Committee

Ohio River Pollution Survey

U. S. Public Health Service
Cincinnati, Ohio
1942

MIAMI RIVER BASIN

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Fig. Mi-1

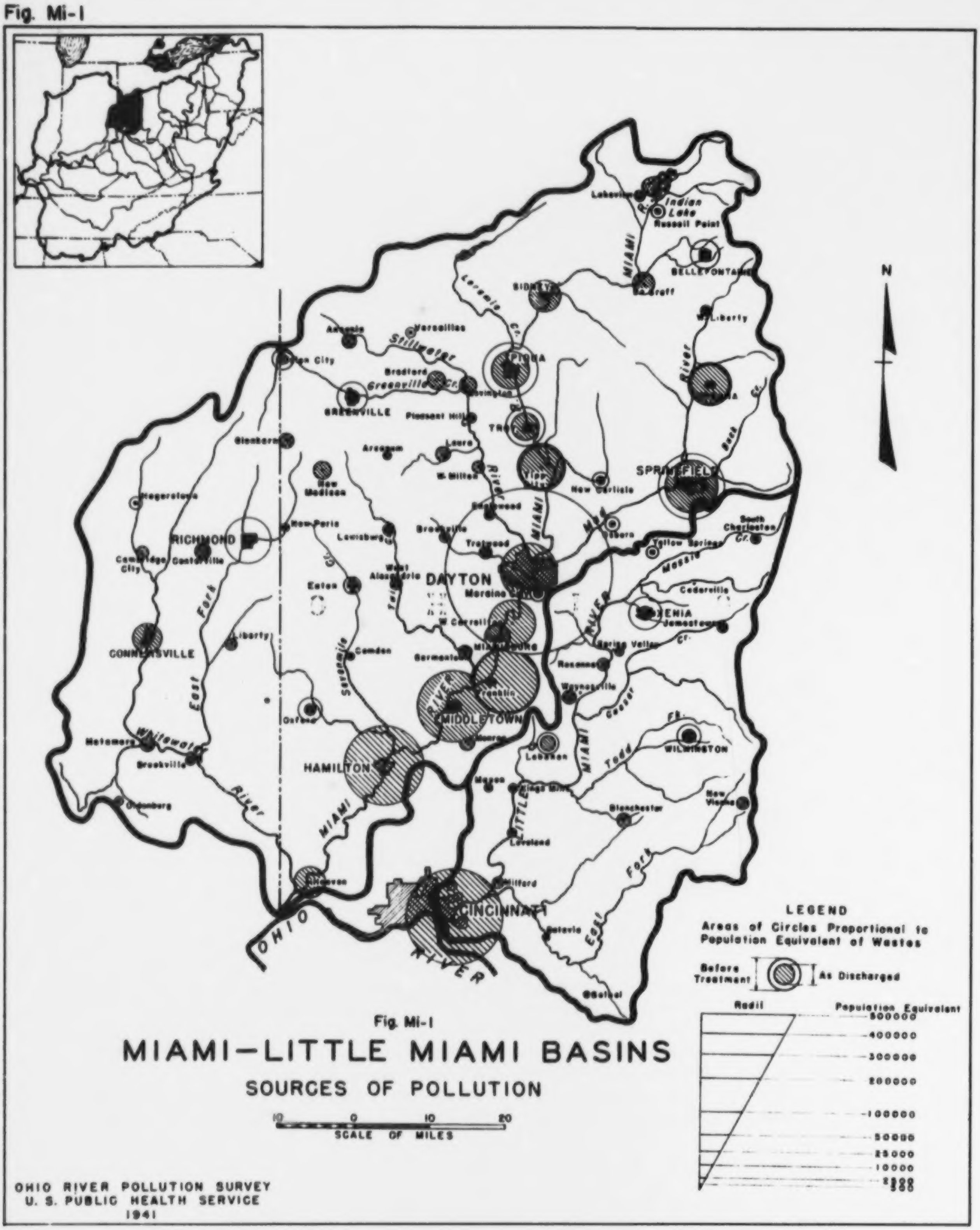

Lakeview
Indian Lake
Russell Point
BELLEFONTAINE
DeGraff
MIAMI
SIDNEY
Loramie Cr.
W. Liberty
River
Buck Cr.
Ansonia
Versailles
Stillwater
Union City
Bradford
Greenville Cr.
Covington
GREENVILLE
PIQUA
Pleasant Hill
TROY
Arcanum
Laura
W. Milton
River
Tipp City
New Carlisle
SPRINGFIELD
Glenkarn
New Madison
Hagerstown
RICHMOND
New Paris
Lewisburg
Brookville
Englewood
Trotwood
MIAMI
Mad
Osborn
Yellow Springs
South Charleston
Cr.
Massie
Cedarville
Cambridge City
Centerville
DAYTON
Moraine
West Alexandria
Eaton
Twin
W. Carrollton
XENIA
Jamestown
RIVER
Cr.
Spring Valley
MIAMISBURG
Germantown
CONNERSVILLE
Liberty
Fork
East
Camden
Sevenmile
Roxanna
Waynesville
Caesar
Franklin
RIVER
MIDDLETOWN
Oxford
Monroe
Fk.
Todd
WILMINGTON
Lebanon
MIAMI
Metamora
Whitewater
Brookville
HAMILTON
River
Oldenburg
Mason
Kings Mills
LITTLE
MIAMI
Blanchester
New Vienna
Loveland
Cleves
Milford
CINCINNATI
OHIO
RIVER
Batavia
East
Fork
Bethel
N
LEGEND
Areas of Circles Proportional to Population Equivalent of Wastes
Before Treatment
As Discharged
Radii
Population Equivalent
500000
400000
300000
200000
100000
50000
25000
10000
2500
500
10 0 10 20
SCALE OF MILES

Fig. Mi-1

MIAMI—LITTLE MIAMI BASINS

SOURCES OF POLLUTION

OHIO RIVER POLLUTION SURVEY
U. S. PUBLIC HEALTH SERVICE
1941

MIAMI RIVER BASIN

Syllabus and Conclusions

Syllabus

The Miami Basin comprises 3,950 square miles in southwestern Ohio and 1,435 square miles in southeastern Indiana and has a population of about 800,000, of which more than 60 percent is urban. The valley of the Miami River is one of the most densely populated and highly industrialized areas in the Ohio Basin and the pollution load is heavy. Progress has been made toward pollution abatement, treatment being practiced at municipalities representing about 75 percent of the sewered population. Industrial wastes are important and limitations in practical known methods of industrial waste treatment are controlling factors in certain cases. Pollution control by increasing low flow does not appear promising. Present minimum flows are relatively high and significant increases in these flows would require large storage.

Conclusions

(1) The abundance of satisfactory underground water has reduced the need for clean streams as sources of water supply but it seems probable that surface sources will be used more extensively in the future. The upper Mad River and the Whitewater River are especially valuable as recreational streams and the increasing demand for recreational facilities warrants the maintenance of high standards of water quality in these streams.

(2) Sewage from 550,500 people in 64 communities and industrial wastes equivalent to sewage from an additional 401,500 people are discharged to sewers. Thirty-one communities have installed sewage treatment plants which treat the sewage from about 75 percent of this population and 40 percent of the industrial waste population equivalent, reducing the total pollution load of 952,000 to a sewered population equivalent of about 482,700, of which nearly 80 percent enters the Miami River directly.

(3) The general picture presented by the laboratory results indicates (a) a relatively clean area in the Whitewater River Basin and on certain smaller tributaries, (b) considerably more pollution of the upper Miami Basin above Dayton, but partial recovery of the streams before receiving successive pollution loads and (c) generally unsatisfactory conditions for most uses in the Mad River below Springfield and in the Miami River from below Dayton to near the mouth.

(4) The principal pollution problem is on the main Miami River from below Dayton to a point near the mouth. Residual pollution following sewage treatment, plus industrial wastes for which only limited methods of treatment are available, prevent a high degree of restoration of the river. Suggested sewage treatment plus the possible industrial waste correction should restore the stream for reasonable use other than domestic water supply except during times of abnormally low flow.

(5) Low-flow regulation by proposed reservoirs on the Whitewater River would have largely intangible value. The existing Miami Conservancy District reservoirs have unregulated outlets and hence have no effect on low flows.

(6) Piqua obtains part of its water supply from the main Miami River 13 miles below Sidney. A high degree of sewage treatment appears justified at Sidney to protect this supply.

(7) A few sections of tributary streams receive pollution in excess of a reasonable limit. These are primarily local problems and the tributaries are of equal or better quality than the Miami River at the points of confluence.

(8) In view of the uses of the streams involved, refined treatment at certain sources of pollution would serve no purpose commensurate with the expenditure. In these instances, lesser treatment appears justified. In other cases, limitations in practical known methods of industrial waste treatment is a governing factor. In such cases refined methods of sewage treatment would cause no valuable improvement and lesser treatment appears justified. A summary of comparative costs of remedial measures from Table Mi-1 follows: -

Treatment	Capital Cost	Annual Charges
Existing	$9,380,000	$745,000
Suggested Additional	4,860,000	660,000

Estimated additional costs over existing charges of programs involving uniform treatment throughout the basin are:

Primary, all places	4,070,000	570,000
Secondary, all places	5,450,000	730,000

Table Mi-1 Miami River Basin - Estimated Cost of Existing and Suggested Minimum Corrective Measures for Sewage and Industrial Wastes, with Comparative Costs for Primary and Secondary Treatment.

	Number of Plants Prim.	Sec.	Population Connected to Sewers	Capital Investment (Dollars)	Annual Charges (Dollars) Amort. & Interest	Operation & Main.	Total
Existing Sewage Treatment	10	21	422,400	9,380,000	555,000	190,000	745,000
Suggested Minimum Correction							
Sewage Treatment Plants	7	18	127,200	2,120,000	150,000	95,000	245,000
Required Interceptors			-	1,560,000	75,000	-	75,000
Independent Industrial Waste Correction	-		-	1,180,000	155,000	185,000	340,000
Total	-		-	4,860,000	380,000	280,000	660,000
Comparative Cost							
Primary Treatment all waste	-		-	4,070,000	320,000	250,000	570,000
Secondary Treatment all waste				5,450,000	415,000	315,000	730,000
As Suggested				4,860,000	380,000	280,000	660,000

Description

The Miami River Basin has a total area of 5,385 square miles of which 3,950 square miles are in southwestern Ohio and the balance in southeastern Indiana. The river rises in Logan County, Ohio and flows in a generally southwesterly direction to join the Ohio River at the Ohio-Indiana State Line.

Major Tributaries	Miles above mouth of Miami River	Drainage Area Sq.Mi.
Whitewater River	5	1,590
Fourmile Creek	38	320
Twin Creek	60	320
Mad River	85	660
Stillwater River	86	670
Loramie Creek	126	260

	Populations			
Larger Cities	1910	1920	1930	1940
Dayton, Ohio	116,577	152,559	200,983	210,718
Springfield, Ohio	46,921	60,840	68,743	70,662
Hamilton, Ohio	35,279	39,675	52,176	50,592
Richmond, Ind.	22,324	26,765	32,493	35,147
Total Basin				
Rural	283,598	290,054	299,370	328,377
Urban	300,439	378,913	480,484	502,104
Total	584,037	668,967	779,854	830,481

Although agriculture in the Miami Basin is important, industrial activities predominate. The most important of these are the metal and paper industries. Other industries of lesser importance include canning, milk and textiles.

Water Uses - Five communities with a total population of about 100,000, secure their water supply from surface streams. Only one, Piqua, uses the main Miami River. The Whitewater and Mad Rivers are used extensively for recreational purposes. Flood control works of the Miami Conservancy District include five retarding dams which are not operable to augment low flows.

Presentation of Field Data

Figure Mi-1 shows the location and magnitude of each source of pollution of consequence in the basin. Figure Mi-2 shows similar data, and, in addition, the location of water supply intakes from streams below sources of pollution and laboratory data on coliform organisms, dissolved oxygen, and B.O.D.

Public Water Supplies - Ground water of generally good chemical quality appears to be plentiful in most sections of the basin. Sixty-four public water supply systems serve about 600,000 people. Fifty-nine of these supplies, which serve about 500,000 people, are from underground sources. The other five supplies, taken wholly or in part from surface sources, are listed in Table Mi-2. All of these are in Ohio. The Springfield supply, although taken from an infiltration gallery, is considered by the state health department to be a surface supply. The city has experienced considerable difficulty in developing an adequate and safe supply from underground sources and may be forced to use one of the nearby streams or to construct an impounding reservoir.

Table Mi-2 Miami River Basin - Surface Water Supplies

Municipality	Source	Mile (1)	Treatment (2)	Population Served	Consumption M.G.D.
Supplies Below Community Sewer Outfalls					
Greenville	Greenville Cr.-Well	139	LD	7,500	0.50
Piqua	Miami R.- Impounded	122	LD	17,000	1.75
Other Surface Supplies					
Eaton	Fourmile Cr.	67	FD	3,500	0.25
Centerville	Lake	82	LD	300	0.01
Springfield	Buck Cr.(Infiltration Gallery)	111	D	73,000	10.00
Total - Below Sewer Outfalls				24,500	2.25
Other				76,800	10.26
Total - Surface Water Supplies				101,300	12.51

(1) Miles above mouth of Miami River.
(2) L - Lime-soda softened, D- Chlorinated, F - Coagulated, settled, filtered.

Table Mi-3 Miami River Basin - Sources of Significant Pollution Including Industrial Waste Expressed as Sewered Population Equivalent (B.O.D.).

Municipality	Stream	Miles Above Mouth of Miami R.	Population Connected to Sewers	Treatment	Sewered Population Equivalent (B.O.D.)	
					Untreated	Discharged
Hooven	Miami River	8	-	-	12,700	12,700
Hamilton	" "	35	54,600	None	86,500	86,500
Middletown	" "	53.6	35,000	"	69,900	69,900
Franklin	" "	61.3	4,000	Secondary	56,800	53,400(1)
Miamisburg	" "	68.6	5,300	None	6,600	6,600
West Carrollton	" "	72	1,800	"	29,300	29,300
Moraine City	" "	76.4	3,000	Secondary	3,000	500
Dayton	" "	82.4	250,000	"	375,500	40,500
Tipp City	" "	104.5	2,500	"	27,100	22,900(1)
Troy	" "	113.1	9,800	Chem.Prec.	19,800	9,900(1)
Piqua	" "	122.1	15,800	Chem.Prec.	37,500	18,800(1)
Sidney	" "	134.8	9,500	None	11,900	11,900
New Carlisle	Honey Creek	114	1,000	Secondary	3,100	500
DeGraff	Buckingaholas Cr.	152	-	-	5,800	5,800
Bellefontaine	Possum Run	165	9,000	Secondary	9,000	1,400
Connersville	W.Fk.Whitewater R.	59	9,800	None	9,800	9,800
Richmond	E.Fk. " "	65	28,000	Secondary	28,000	1,200
New Madison	" " " "	81	300	None	3,300	3,300
Oxford	Fourmile Creek	55	6,500	Secondary	6,500	1,000
Eaton	Sevenmile Creek	67	3,200	"	3,200	500
Springfield	Mad River	111	59,000	Primary	59,000	38,000
Urbana	Dugan Run	126	6,000	Secondary	23,700	19,000
Covington	Stillwater River	119	1,400	None	3,000	3,000(2)
Bradford	Ballinger Run	125	500	"	3,400	3,400
Greenville	Greenville Creek	139	7,100	Secondary	11,000	2,200
Ansonia	Stillwater River	147	300	None	2,800	2,800
Union City	Dismal Creek	154	1,100	Secondary	4,700	700
Small Sources (in 44 towns)	-	-	26,000	Various	39,100	27,200
Total			550,500		952,000	482,700

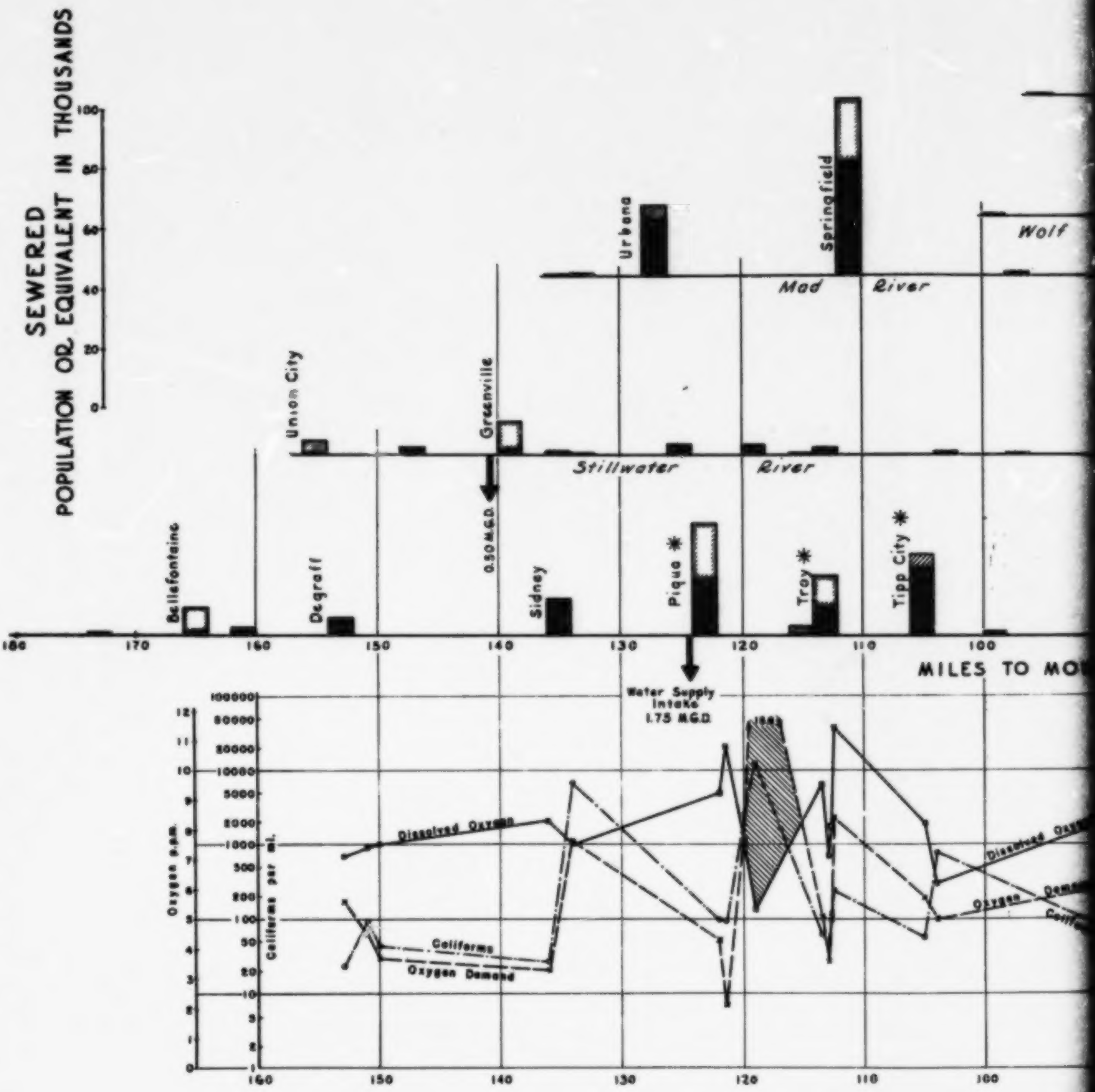
(1) Sewage Treatment Plant, under const. at time of laboratory survey (1939), now completed.
(2) " " " " " (1941).

Sewerage - Public sewerage systems serve 64 municipalities with a combined population of about 550,000, of which 390,000 or about 70%, reside in the area from Hamilton to Dayton (mile 33 to 85). Twenty-seven pollutional sources of consequence are shown in Table Mi-3. Secondary treatment of waste is provided at 21 communities serving 333,000 or about 60% of the total sewered population. Primary treatment is provided at 10 municipalities serving 89,000 population.

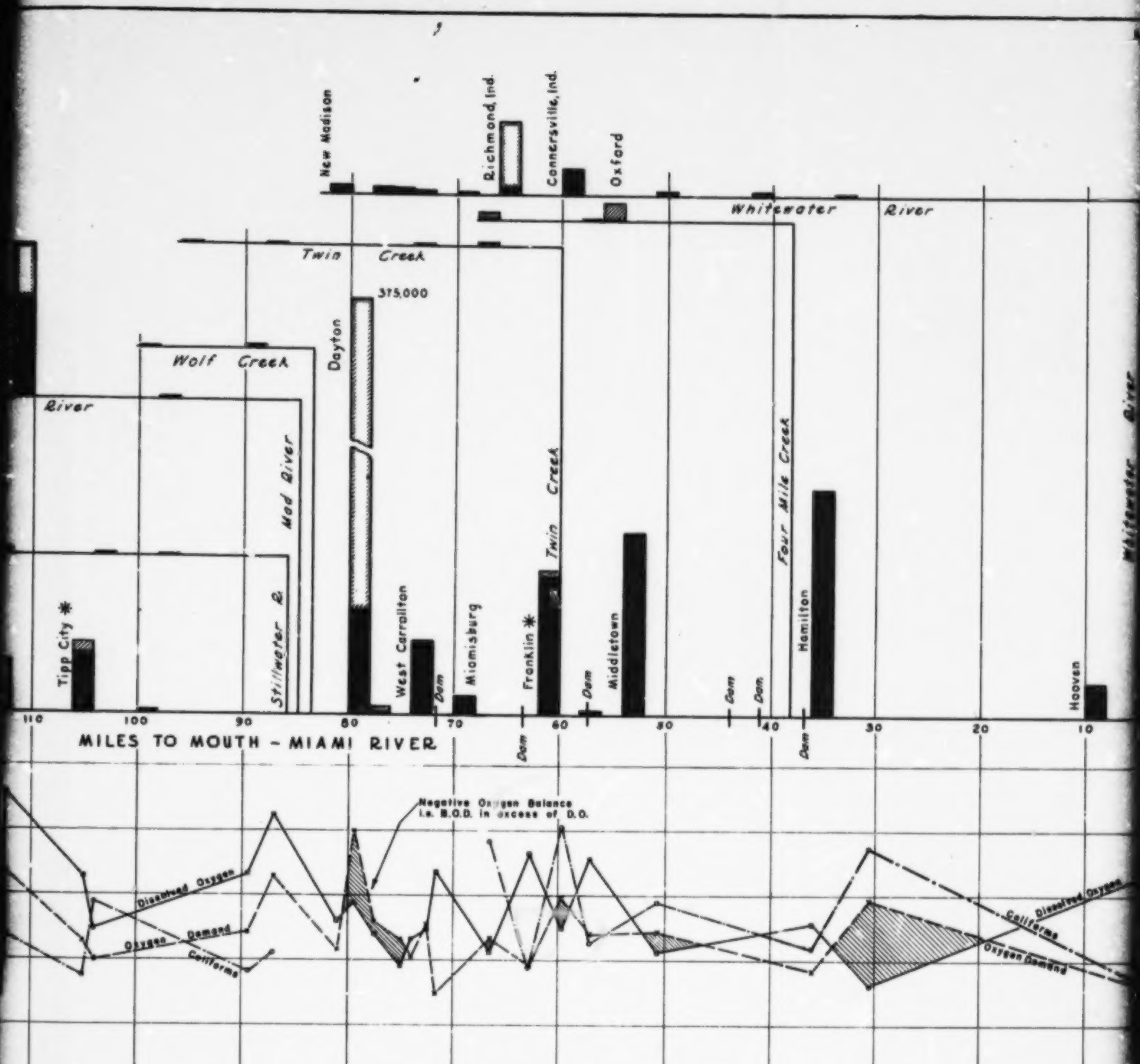
Industrial Waste - Eighty-six industrial plants, wholly or partly unconnected to municipal treatment are summarized in Table Mi-4. Numerous waste producing industrial plants discharge to municipal treatment facilities, particularly at Dayton, Ohio, where an industrial load of about 120,000 reaches the treatment plant. The industrial waste load in the basin, as B.O.D., totals about 401,000 population equivalent.

Table Mi-4 Miami River Basin - Summary of Industrial Wastes not Discharging to Municipal Treatment Plants, with Total of Entire Industrial Waste Load in the Basin.

Industry	Number of Plants	Industrial Waste Disposal		At Least Minor Corrective Measures Taken	Estimated Sewered Population Equivalent (B.O.D.)
		Munic. Sewers	Private Outlets		
Ohio					
Canning	10	2	8	4	22,700
Meat	6	2	4	2	3,200
Metal	8	4	4	3	-
Milk	14	7	7	3	1,500
Paper	21	5	16	17	167,000
Miscellaneous	10	6	4	4	36,800
Ohio	69	26	43	33	231,200
Indiana					
Canning	4	0	4	2	4,100
Metal	11	8	3	5	-
Miscellaneous	2	1	1	-	-
Indiana	17	9	8	7	4,100
Waste Unconnected Munic. Treatment	86	35	51	40	235,300
Waste Connected to Municipal Treatment					166,200
Total Industrial Waste in Basin					401,500



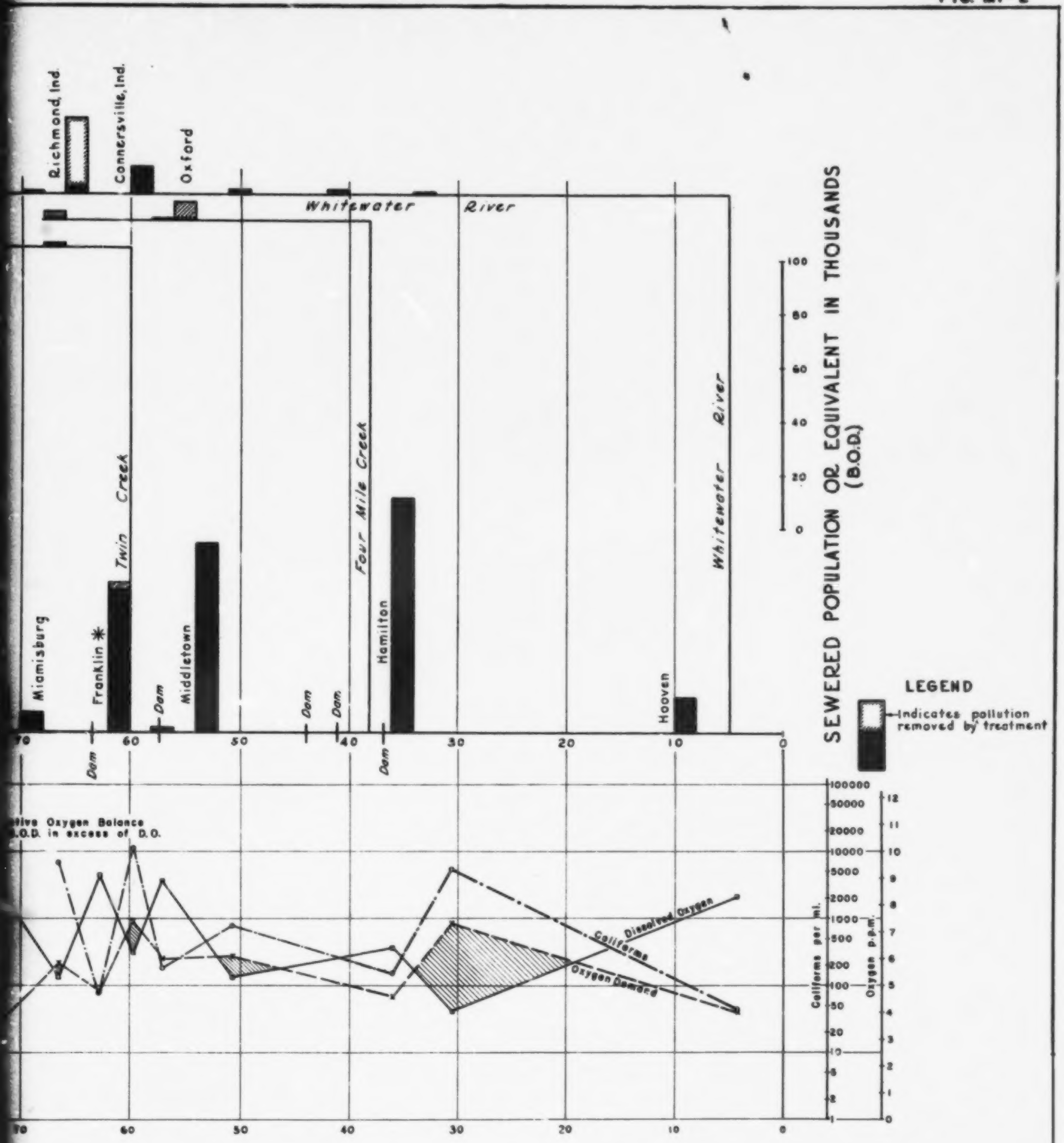
* Sewage Treatment Plant under Construction at time of Laboratory Survey (1939), now completed.



t Plant under
time of Laboratory
r completed.

NOTE: Data plotted are for
September - 1939

FIG. MI-2



NOTE: Data plotted are for September-1939

FIGURE Mi-2

MIAMI RIVER

SOURCES OF POLLUTION

AND

SELECTED LABORATORY RESULTS

OHIO RIVER POLLUTION SURVEY

U.S. PUBLIC HEALTH SERVICE

Presentation of Laboratory Data

Laboratory data for the Miami River Basin are presented in Table Mi-7. All samples on the Whitewater River and along the Miami River from Miamisburg to the mouth were analyzed at the Cincinnati laboratory from one to three times monthly during the period February, 1939 to April, 1940. Six stations immediately above Dayton and six stations below Dayton's sewage treatment plant were sampled from three to five times monthly and analyzed by personnel of the Dayton plant during the period June to December, 1939. All remaining points were sampled from one to three times by a mobile laboratory unit in September,1939.

Selected monthly average results at some of the principal points in the basin are tabulated with flows on sampling days and during the minimum month of record in Table 5. In general, the results selected represent the lowest flow conditions during the sampling period.

Stream flow conditions varied from high discharges in the spring and early summer of 1939 and the early spring of 1940 to moderately low discharges in the late summer and winter of 1939-40. Bad ice conditions were present in January, 1940.

Spot symbol maps showing the average coliform, dissolved oxygen and oxygen demand results are shown in Figures Mi-3, Mi-4 and Mi-5 respectively. The results represent the most unfavorable monthly averages observed at each station sampled over a period of several months and the average of all samples at each station sampled for less than one month.

In the basin as a whole, 55 percent of all stations had an average coliform count of more than 200 per ml. for at least one month during the period observation; 26 percent of all stations had most unfavorable average counts of from 50 to 200 per ml.; and 19 percent of all stations had coliform averages of less than 50 per ml. for the most unfavorable monthly average condition during the period of observation. The highest counts were observed below Bellefontaine. High coliform counts also were observed below Piqua, Greenville, and Springfield and along the main stream from Dayton to below Hamilton. Moderately high counts were found below Richmond, Connersville, and Brookville on the Whitewater River. Coliform counts are omitted from the results of those samples examined at the Dayton sewage treatment plant as these results were expressed in the Phelps' index instead of most probable numbers as were all other results. Coliform counts at stations immediately above sources of pollution were lowest during the period September, 1939 to January, 1940, coinciding with the fall and winter low-flow period. The coliform counts at stations immediately below sources of pollution were more erratic in this respect.

The dissolved oxygen results, considering the basin as a whole, were fairly good. Minimum monthly averages were generally in excess of 6.5 p.p.m. Except at Bellefontaine, where zero dissolved oxygen was found, the lowest averages observed were over 3.0 p.p.m. The lowest values were found during the months, June to October, when temperatures and oxygen demand values were highest. The most consistently low values were found in the stretch from Dayton to below Hamilton on the main river.

The highest monthly average B.O.D. results at 36 percent of the stations were in excess of 5.0 p.p.m. At 38 percent of the stations the most unfavorable monthly average was between 3.1 and 5.0 p.p.m. and at 26 percent of the stations it was 3.0 or less. The station immediately below Bellefontaine had the highest B.O.D. observed in the basin, 36.6 p.p.m. The station below Piqua was next with 15.6 p.p.m. Oxygen demands of from four to six p.p.m. were general throughout the period of observation in the Miami River from Dayton to the mouth. On the Whitewater River, results were generally less than 3.0 p.p.m. and often less than 1.0 p.p.m. The highest values observed at Richmond, Connersville, and Brookville followed the ice conditions of January, 1940.

Biological Summary - The flora and fauna of the Miami River were found to be abundant in species and number, especially in the stretch below Dayton. This is due to the population concentration in the cities along the stream. The average volume of plankton at the various stations along the main stream ranged from 3,000 to 8,000 p.p.m., a high concentration of plankton. The plankton volume of the tributaries, the Whitewater, Stillwater, and Mad Rivers, was found to be less than 3,000 p.p.m.

Table Mi-5 Miami River Basin - Selected Laboratory Data

River	Miami		Miami at Dayton			Miami	
Location	above Sidney	below Sidney	above Outfall	½ Mi. below	5 Mi. below	above Miamisburg	below Miamisburg
River Miles Above: Mouth of Miami	136	134	83	82	77.5	71.6	66.5
Period - 1939	Sept.	Sept.	Sept.	Sept.	Sept.	Oct.	Oct.
Number of Samples	3	2	4	4	4	2	2
Flow in c.f.s.: Sampling Days	72	66	313	-	-	540	540
Minimum Month	22	22	226	-	-	-	-
Water Temperature °C.	17.7	17.5	24.4	24.2	23.3	17.8	17.8
Coliforms per ml.	26	6650	-	-	-	680	635
Dissolved oxygen ppm.	8.3	7.5	6.5	7.2	4.8	6.9	5.0
B.O.D., 5-day, p.p.m.	3.3	7.6	5.4	10.0	5.8	3.2	4.3

River	Miami		Miami		Miami		Miami
Location	above Franklin	below Franklin	above Middletown	below Middletown	above Hamilton	below Hamilton	Cleves Bridge
River Miles Above: Mouth of Miami	62.8	59.6	57	50.8	35.9	30.4	4.2
Period - 1939	Oct.	Oct.	Oct.	Oct.	Sept.	Sept.	Sept.
Number of Samples	2	2	2	2	3	3	6
Flow in c.f.s.: Sampling Days	555	555	560	560	747	747	696
Minimum Month	-	-	-	-	286	286	-
Water Temperature °C.	17.3	17.3	15.5	18.0	24.2	23.5	21.8
Coliforms per ml.	190	24,800	126	660	140	5200	41
Dissolved oxygen ppm.	7.2	4.3	8.2	4.2	6.4	4.0	8.3
B.O.D., 5-day, p.p.m.	4.0	7.8	3.1	8.6	4.6	7.3	4.0

River	Stillwater River			Mad		Mad	
Location	above Covington	below Covington	Mouth	above Urbana	below Urbana	above Springfield	below Springfield
River Miles Above: Conf. with Miami	34	32	0	42	40	27	26
Mouth of Miami	120	118	86	127	125	112	111
Period - 1939	Sept.	Sept.	Sept.	Sept.	Sept.	Sept.	Sept.
Number of Samples	2	2	4	2	2	3	2
Flow in c.f.s.: Sampling Days	12	12	-	65	65	185	199
Minimum Month	-	-	-	40	40	114	114
Water Temperature °C.	19.0	20.0	21.7	16.8	17.5	14.8	17.3
Coliforms per ml.	13	1,900	178	15	219	152	235
Dissolved oxygen ppm.	6.0	4.0	7.3	8.7	8.3	8.2	5.7
B.O.D., 5-day, p.p.m.	2.2	2.4	2.3	1.4	2.3	2.1	4.2

River	W. Fk. Whitewater		E. Fk. Whitewater		Whitewater at Brookville		
Location	above Connersville	below Connersville	above Richmond	below Richmond	W. Fork above	E. Fork above	below
River Miles Above: Conf. with Miami	57	56	61	60	28	28	26
Mouth of Miami	62	61	66	65	33	33	31
Period - 1939	Sept.	Sept.	Oct.	Oct.	Sept.	Sept.	Sept.
Number of Samples	1	1	1	1	1	1	1
Flow in c.f.s.: Sampling Days	69	69	37	37	-	-	140
Minimum Month	47.1	47.1	-	-	-	-	95.5
Water Temperature °C.	16.5	19.0	23.0	22.0	17.5	18.5	18.0
Coliforms per ml.	4	460	240	240	4	24	240
Dissolved oxygen ppm.	8.2	7.2	5.0	5.7	8.2	8.0	8.2
B.O.D., 5-day, p.p.m.	1.2	2.0	1.6	2.1	.9	1.1	.9

Fig. Mi-3

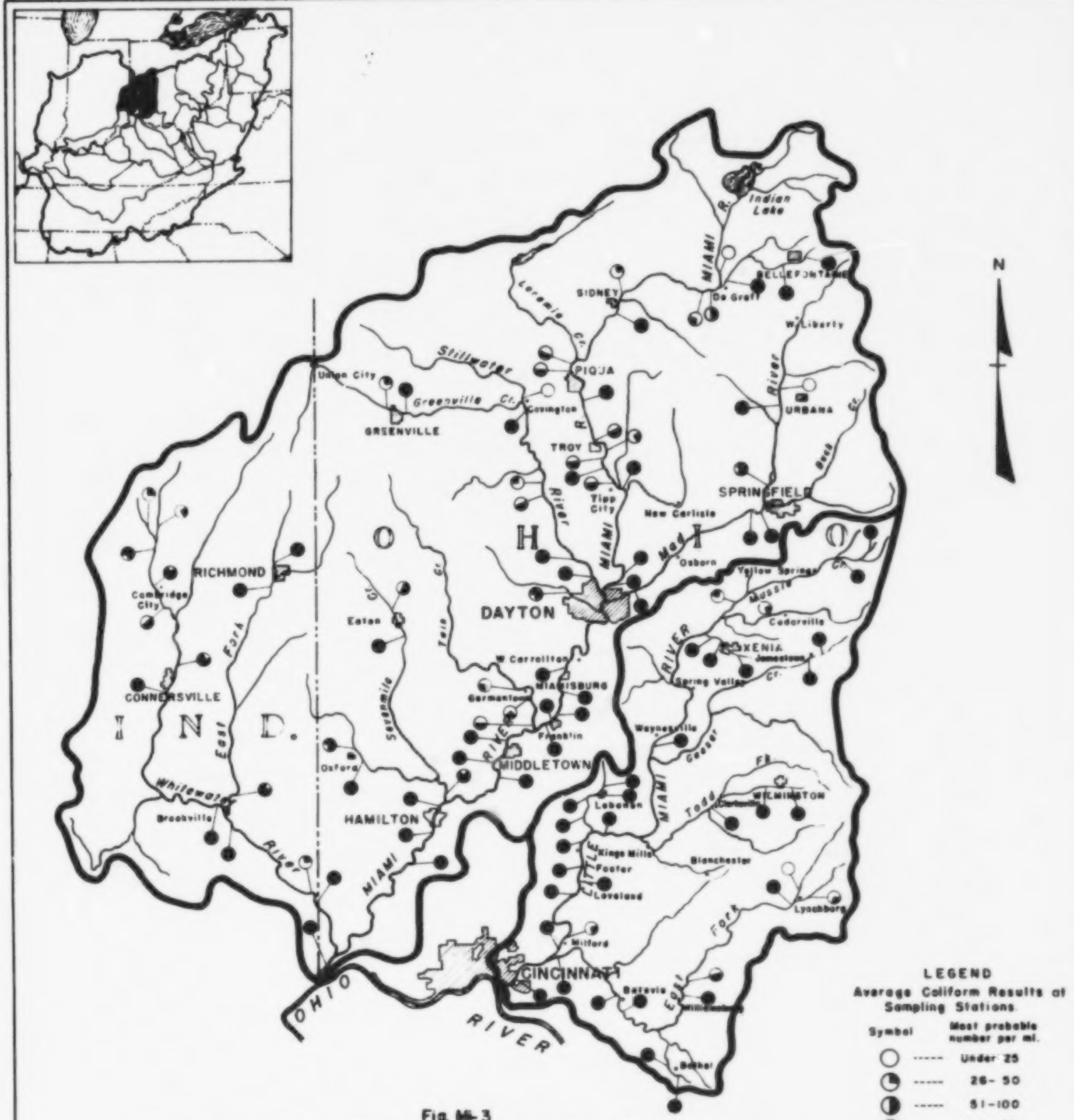

N
Indian Lake
MIAMI R.
BELLEFONTAINE
De Graff
W. Liberty
SIDNEY
Loramie Cr.
Stillwater
PIQUA
Union City
Greenville Cr.
Covington
GREENVILLE
URBANA
River
Buck Cr.
TROY
Tipp City
SPRINGFIELD
New Carlisle
Mad
Osborn
Yellow Springs
Massie Cr.
RICHMOND
Cambridge City
O H I O
DAYTON
Eaton
Twin Cr.
Sevenmile Cr.
Cedarville
XENIA
Jamestown
Spring Valley
W. Carrollton
MIAMISBURG
Germantown
Franklin
CONNERSVILLE
I N D.
East Fork
Oxford
MIDDLETOWN
Waynesville
Caesar Cr.
WILMINGTON
Todd Fk.
Whitewater
Brookville
HAMILTON
Lebanon
Kings Mills
Foster
Loveland
Blanchester
Lynchburg
LITTLE MIAMI
Milford
CINCINNATI
Batavia
Williamsburg
East Fork
Bethel
OHIO RIVER

Fig. Mi-3

MIAMI–LITTLE MIAMI BASINS

COLIFORM RESULTS

10 0 10 20
SCALE OF MILES

LEGEND

Average Coliform Results at Sampling Stations.

Symbol	Most probable number per ml.
○	Under 25
◔	26– 50
◑	51–100
◕	101–200
●	Over 200

OHIO RIVER POLLUTION SURVEY
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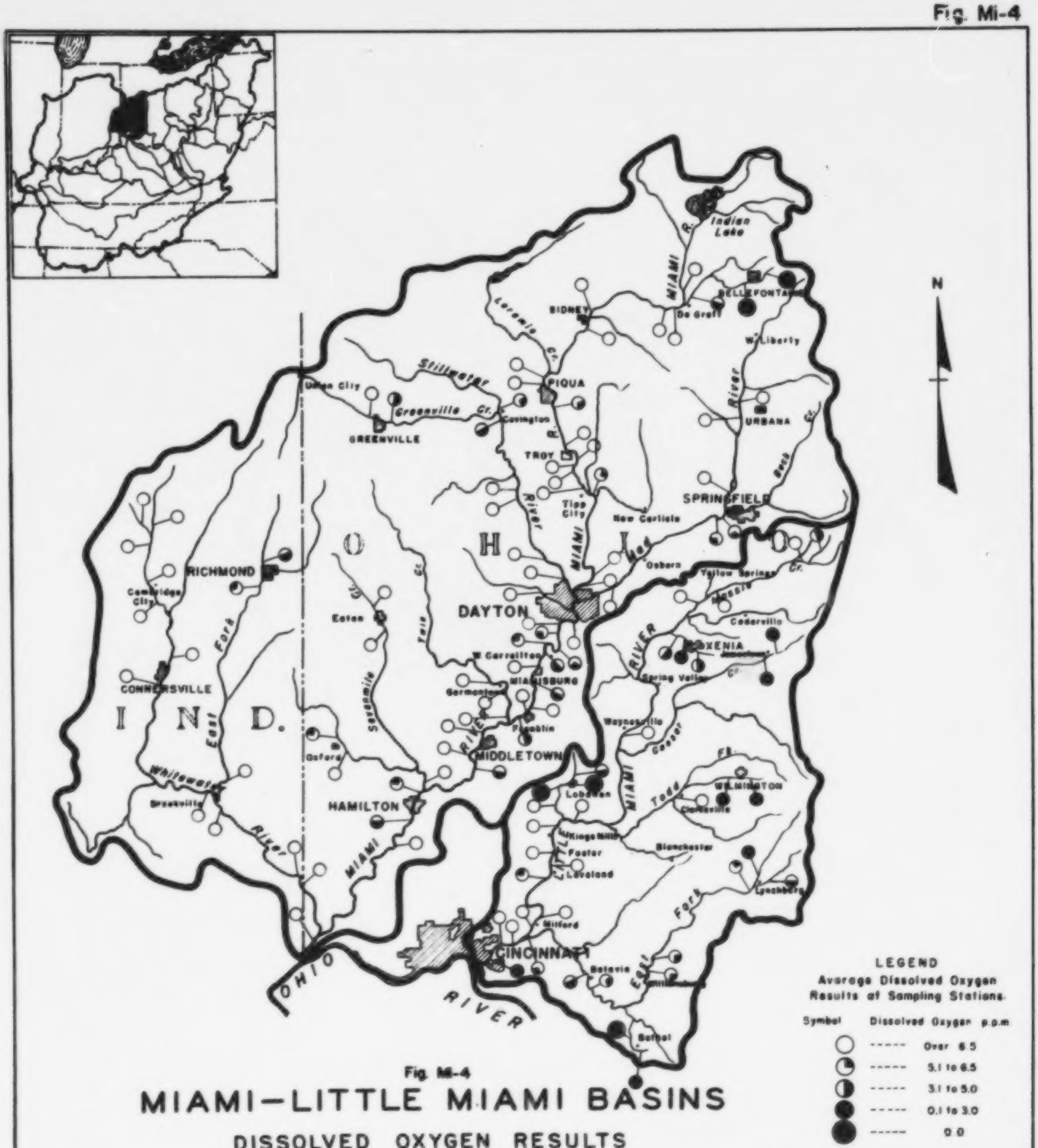
Indian Lake
MIAMI R.
BELLEFONTAINE
De Graff
W. Liberty
SIDNEY
Loramie Cr.
PIQUA
Stillwater
Union City
Greenville Cr.
GREENVILLE
Covington
River
URBANA
Buck Cr.
TROY
Tipp City
MIAMI
SPRINGFIELD
New Carlisle
Mad
Osborn
Yellow Springs
Cr.
O
H
I
O
RICHMOND
Cambridge City
Eaton
Twin Cr.
DAYTON
W. Carrollton
Cedarville
XENIA
Spring Valley
CONNERSVILLE
East Fork
MIAMISBURG
Germantown
Sevenmile Cr.
I N D.
Waynesville
Franklin
Oxford
MIDDLETOWN
RIVER
Caesar Cr.
Whitewater
Brookville
River
HAMILTON
Lebanon
Todd Fk.
WILMINGTON
Clarksville
Kings Mills
Foster
Blanchester
Loveland
Lynchburg
Milford
CINCINNATI
Batavia
East Fork
Bethel
OHIO RIVER
N
LEGEND
Average Dissolved Oxygen
Results of Sampling Stations.
Symbol Dissolved Oxygen p.p.m.
○ ----- Over 6.5
◔ ----- 5.1 to 6.5
◑ ----- 3.1 to 5.0
◕ ----- 0.1 to 3.0
● ----- 0.0

Fig. Mi-4

MIAMI—LITTLE MIAMI BASINS

DISSOLVED OXYGEN RESULTS

10 0 10 20
SCALE OF MILES

OHIO RIVER POLLUTION SURVEY
U. S. PUBLIC HEALTH SERVICE
1941

Fig. Mi-5

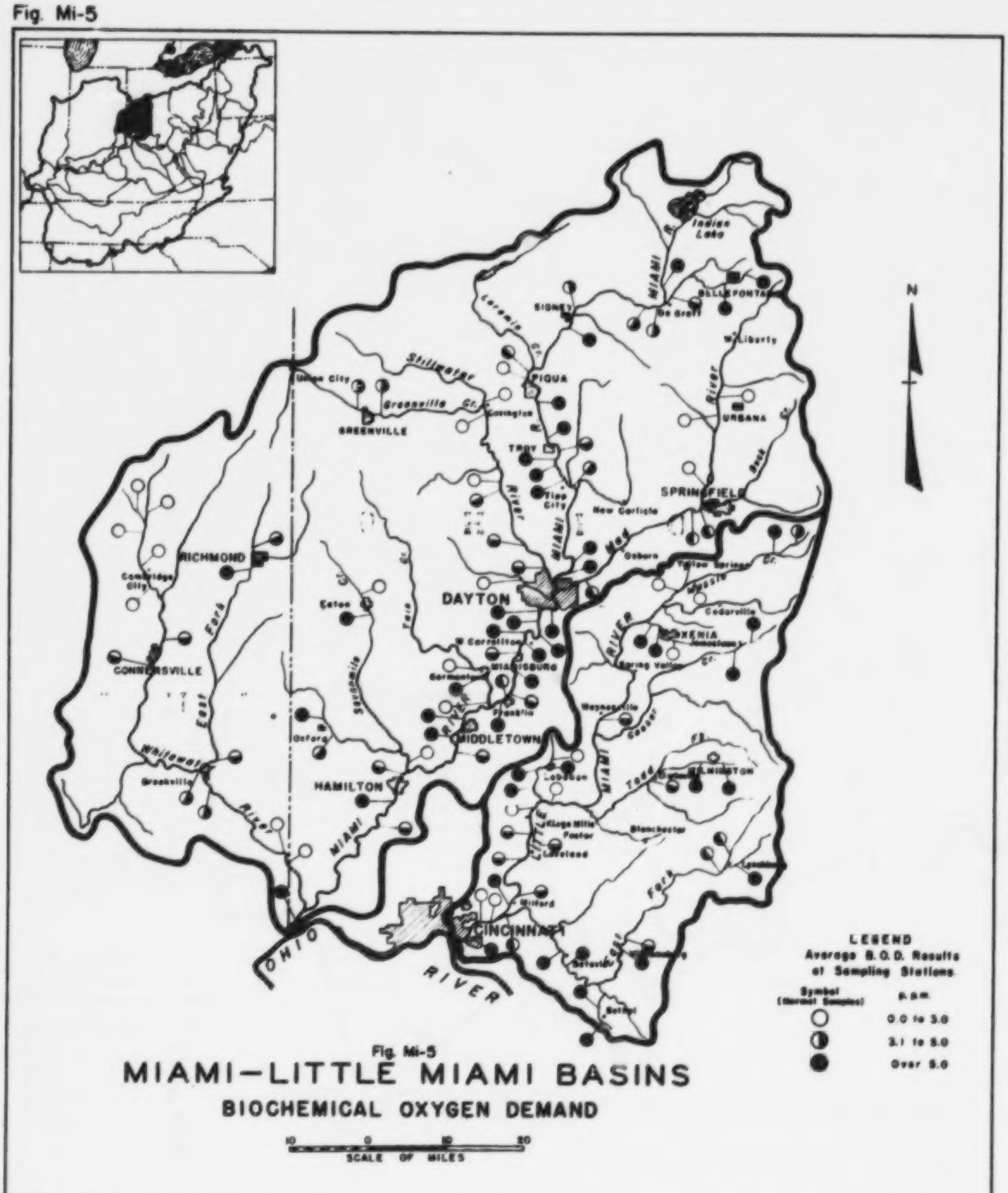
N
Indian Lake
BELLEFONTAINE
De Graff
W. Liberty
SIDNEY
Loramie Cr.
PIQUA
Stillwater
Union City
Greenville Cr.
GREENVILLE
Covington
URBANA
TROY
Tipp City
New Carlisle
SPRINGFIELD
Miami R.
Mad
Osborn
Yellow Springs
RICHMOND
Cambridge City
DAYTON
Eaton
Twin Cr.
W. Carrollton
MIAMISBURG
Germantown
Franklin
XENIA
Cedarville
Spring Valley
CONNERSVILLE
East Fork
Whitewater River
Seven Mile Cr.
Oxford
MIDDLETOWN
Waynesville
HAMILTON
Lebanon
WILMINGTON
Todd Fk.
Kings Mills
Foster
Loveland
Blanchester
Little Miami River
East Fork
Milford
CINCINNATI
OHIO RIVER
Batavia
Bethel
LEGEND
Average B.O.D. Results of Sampling Stations
Symbol (Normal Samples)
p.p.m.
○ 0.0 to 3.0
◐ 3.1 to 5.0
● Over 5.0
10 0 10 20
SCALE OF MILES

Fig. Mi-5

MIAMI–LITTLE MIAMI BASINS

BIOCHEMICAL OXYGEN DEMAND

OHIO RIVER POLLUTION SURVEY
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Hydrometric Data

Twenty-six stream gaging stations have been maintained on the Miami River Basin for varying periods, 14 of which are in operation at the present time. Two active stations are in Indiana and all other stations, active and inactive, are in Ohio. Eight stations of importance from the pollution standpoint have been selected and the monthly mean summer flows for three years in which the low summer flows have occurred are presented in Table Mi-6.

Figure Mi-6 presents summer low-flow frequency curves from June to September inclusive for the Miami River at Dayton and Hamilton, Ohio. These curves indicate that the frequency with which various minimum monthly mean flows may be expected is as follows:

Location	Minimum Monthly Mean Summer Flows in Cubic Feet per Second that may be expected once in				
	1 Year	2 Years	5 Years	10 Years	Minimum
Dayton, O.	1,770	450	320	280	240
Hamilton, O.	2,800	740	490	410	340

Proposed Stream Control - A study to determine the feasibility of adapting the five existing Miami Conservancy District flood control reservoirs in the comprehensive flood control plan for the Ohio River is being made in connection with a survey report being prepared by the U.S. Engineer Department. A study also is being made to determine the feasibility of constructing two or more reservoirs on the Whitewater River watershed in this same survey report. Consideration is being given in these studies to the operation of the reservoirs for pollution abatement. The Whitewater River reservoirs would have little value for pollution abatement since the unregulated flow below them is large enough to eliminate the need for more than primary treatment. The need for flow regulation on the lower Miami is discussed in the following section of this report.

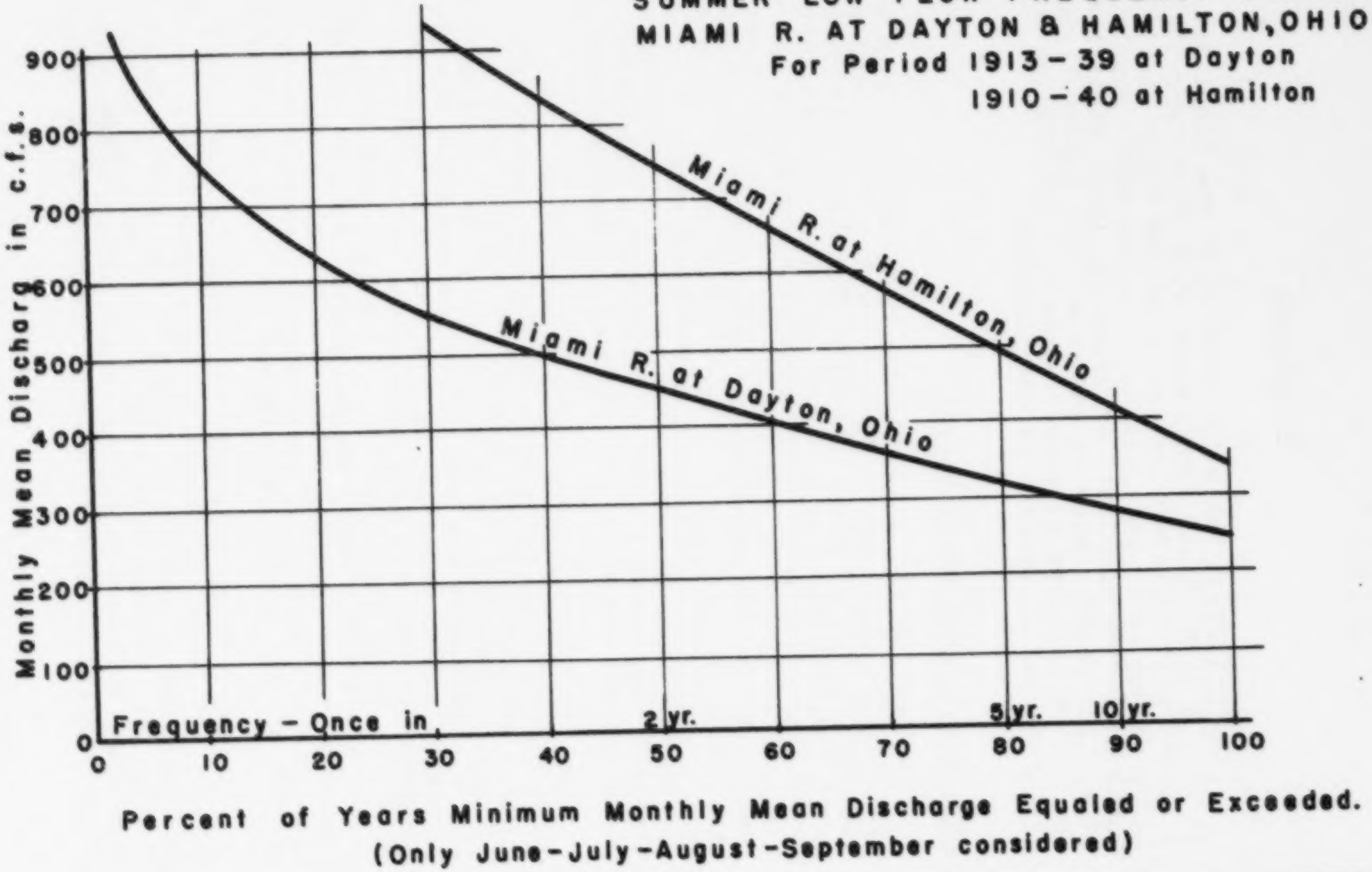
Table Mi-6 Miami River Basin - Monthly Mean Summer Flows for Years in which Low Summer Flows have Occurred.

River	Miami	Miami	Miami	Miami
Location	Hamilton	Dayton	Taylorsville	Sidney
River Miles Above:				
Mouth of Miami	35	82	94	135
Drain. Area Sq. Mi	3,639	2,510	1,160	545
Period of Record	1910-40	1915-40	1922-40	1914-40
Year	1930	1932	1932	1932
June c.f.s.	845	1,220	430	227
July "	492	1,120	371	118
August "	458	323	84	38
September "	589	311	80	38
Year	1934	1934	1934	1934
June "	445	336	146	58
July "	482	263	101	25*
August "	582	399	175	38
September "	357	240*	72	28
Year	1936	1936	1936	1936
June "	620	430	125	61
July "	335*	254	71*	40
August "	391	255	73	34
September "	516	326	97	38

River	Whitewater	Twin Creek	Mad River	Stillwater
Location	Brookville	Germantown	Springfield	Pleasant Hill
River Miles Above:				
Conf. with Miami	27	7	26	28
Mouth of Miami	32	67	111	115
Drain. Area Sq.Mi.	1,190	275	485	502
Period of Record	1928-40	1914-40	1914-40	1916-26, 1935-40
Year	1930	1928	1923	1924
June c.f.s.	257	522	276	2,120
July "	141	216	196	137
August "	102	30	210	35
September "	201	12	174	24
Year	1934	1930	1934	1935
June "	161	25	130	232
July "	136	9	115	102
August "	164	6*	150	30
September "	111*	15	114*	30
Year	1936	1936	1936	1936
June "	226	23	192	44
July "	139	12	137	29
August "	163	27	137	24*
September "	509	89	201	26

* Minimum Month.

FIGURE Mi-6
SUMMER LOW FLOW FREQUENCY CURVES
MIAMI R. AT DAYTON & HAMILTON, OHIO
For Period 1913 – 39 at Dayton
1910 – 40 at Hamilton



Discussion

The principal pollution problem in the Miami River Basin is on the Miami River from Dayton to a point near the mouth. A lesser pollution problem exists on the upper Miami River below Sidney where pollution affects the water supply of Piqua. Minor pollution problems, of primarily local significance, exist at various points below 14 moderate sized and small municipalities. Corrective measures at these points are included in the cost estimates but discussion is not included.

Main Miami River below Dayton

Between Dayton and Hamilton, the most seriously polluted section, the Miami River receives wastes from a sewered population equivalent of about 300,000. Two large tributaries, Twin Creek and Fourmile Creek, enter the river in this section with beneficial effects on the quality of the water of the main stream. Pollution is due almost entirely to the discharge of sewage and industrial wastes at Dayton, West Carrollton, Miamisburg, Franklin, Middletown and Hamilton. Dayton, and more recently Franklin, have constructed plants for the secondary treatment of sewage. The other cities have no sewage treatment plants at the present time. At Franklin a considerable amount of industrial wastes enters the Miami directly without treatment.

During the low water month of September, 1939, the Miami River above Dayton had a high biochemical oxygen demand (5.4 p.p.m.) but the dissolved oxygen was satisfactory for all uses. Pollution appeared to be assimilated without serious nuisance in the stream with the small dilution available due probably to oxygen demand reduction by sedimentation behind dams, reaeration over the six dams and because of the distance between points of waste discharge (8 to 12 miles) permitting partial recovery between sources of pollution. Despite the absence of gross nuisances from pollution, the dissolved oxygen fell to 5.0 p.p.m. or less below every city of consequence in this stretch of the river. The minimum was 4.0 p.p.m. below Hamilton.

A number of factors make it extremely difficult for the present, at least, to secure a high degree of restoration of the Miami River from below Dayton to the mouth. These factors include the residual pollution load represented by the treatment plant effluent at Dayton, which cannot be appreciably reduced except at excessive cost; the presence of sewage from other communities from which there will always be some residual pollution even following treatment; and the discharge of industrial wastes for which only limited methods of treatment are now available.

The paper pulp and paper industry is an important contributor of organic pollution in this area. Considerable progress has already been made toward controlling this pollution. In certain cases further corrective steps can be taken such as the use of closed water systems, the installation of save-alls and waste treatment. Consideration of the paper and other types of industry in this area, and the experience in treating similar wastes elsewhere, leads to the conclusion that treatment may reduce the industrial pollution load possibly 30 percent by proven methods, or from 157,100 to 111,000 based on oxygen demand sewered population equivalent. Reduction in suspended solids might be greater. As part of the present industrial pollution load represents a residual after treatment, such loads cannot readily be further reduced at a reasonable cost.

Lower flows than those which occurred in September, 1939, occur frequently at Dayton. Normal population and industrial growth in the future will increase the pollution load in this area.

The addition of secondary treatment at Dayton, in 1939, went far in correcting pollution in the Miami River below this community. Even with complete treatment, the river below Dayton will have to be relied upon to supplement artificial purification by natural processes, so that a section of varying length below this community is still, and probably will continued to be, a critical section as regards oxygen balance. Above Miamisburg, about 11 miles below the Dayton sewer outfall, natural recovery raises the dissolved oxygen temporarily to a satisfactory level (6.9 p.p.m.). In the low-flow month of September, 1939, pollution below this point reduced the dissolved oxygen successively to 5.0, 4.3, 4.2 and 4.0 parts per million with satisfactory dissolved oxygen recovery below each successive entrance of pollution. This pollution is capable of considerable reduction by known economical methods.

In view of the above facts, it appears impractical to attempt further improvement of the stream immediately below Dayton. However, improvement of the river below Miamisburg and lower points appears possible and justified.

Primary treatment of sewage at Hamilton, Middletown, Miamisburg and West Carrollton, in addition to certain treatment and other corrective measures for industrial wastes should greatly improve the lower river. Except during abnormally dry years, this improvement should be sufficient for all present and reasonable future uses of the stream including the support of all but the highest type of fish.

While secondary treatment of sewage would further reduce the pollution, it is doubtful, due to the present limitations in possible economical methods for treatment of industrial wastes, if any useful purpose or valuable improvement commensurate with the cost of such treatment would result.

Primary treatment works, built with a view to addition of secondary treatment facilities at a later date, are amply warranted. Research should be applied to the development of more efficient methods of industrial waste treatment. Should such methods be developed, secondary treatment of sewage might well be justified.

The possibility of low-flow regulation as a means of improving conditions in this area has been considered. Reservoir sites of the size necessary to afford much regulation of value to the lower Miami are practically limited to the ones already constructed by the Miami Conservancy District. These flood-control reservoirs have no permanent pools and unregulated outlets. The U. S. Engineer Department is now studying the feasibility of providing outlet control works at these dams.

If, by using these reservoirs for low-flow regulation flows ranging from about 400 c.f.s. at Dayton to about 700 c.f.s. at Hamilton could be provided during the summer months, stream conditions could be greatly improved. The program of sewage and industrial waste treatment outlined above would still be necessary but the need for more complete treatment would be deferred or possibly eliminated. Relatively large storage capacities would be required to provide the necessary supplemental low flow.

Sidney

One of the few surface water supplies on the Miami River Basin is at Piqua. Water is taken from the main Miami River about 13 miles below Sidney. A high standard of water quality should be maintained to safeguard this water supply. Under the circumstances, secondary treatment of all wastes at Sidney is justified to take the place of the present discharge of untreated sewage.

Miscellaneous Pollution

A number of minor sources of wastes on the Miami River and its tributaries cause serious pollution of primarily local significance. Remedial measures appear justified at Connersville and New Madison in the Whitewater River Basin, Springfield and Urbana in the Mad River Basin, and Bradford and Ansonia in the Stillwater River Basin. Some industrial waste correction is needed at most of these places.

Cost estimates for remedial measures for pollution abatement suggested, as justified by the stream uses are summarized on Table Mi-1.

TABLE Mi-7 MIAMI RIVER BASIN

OHIO RIVER POLLUTION SURVEY
LABORATORY DATA

SUMMARY OF INDIVIDUAL RESULTS

Sampling Point	Mileage From Mouth	Date 1939	Average Discharge c.f.s.	Temp. °C	Dissolved Oxygen		5 Day B.O.D. p.p.m.	Coliforms M.P.N. Per ml.	pH	Turbidity p.p.m.	Alkalinity p.p.m.	Hardness p.p.m.
					p.p.m.	% Sat.						
Miami River - Above DeGraff, Ohio	Mi 153	Sept. 21	62	17.5	7.1	73.5	5.6	23	8.2	100	156	
Jacket Creek-Bridge on U.S. 33 - Above Bellefontaine, Ohio	MiBuJ 171	Sept. 13	24	18.0	0.0	00.0	19.5	15,000	7.6	5	395	
Jacket Creek-½ mile [illegible] of Bellefontaine, Ohio	MiBuJ 170	" 13		20.0	0.0	00.0	25.0	110,000	7.5	10	400	
" "	" "	" 19		15.0	0.0	00.0	36.2	240,000	7.5	41		
Buckongahelas Creek Above Degraff, Ohio	MiBu 153	Sept. 21		15.0	4.4	43.3	3.4	930	7.8	10	284	
Miami River Below DeGraff, Ohio	Mi 151	Sept. 21	62	17.5	7.4	77.3	4.5	93	7.9	102	162	
Miami River - Above Quincy, Ohio	Mi 150	Sept. 21		17.5	7.5	78.2	3.7	43	8.0	98	200	
Miami River - Above Sidney, Ohio	Mi 136	Sept. 13		19.0	9.0	96.5	2.1	9	8.1	38	270	
" "	" "	" 19		19.0	7.9	84.9	3.9	46	8.4	93	238	
" "	" "	" 22		15.0	7.9	77.9	3.9	24	8.3	76		
Miami River-1 mi. south on U.S. Rte. 25 Sidney, Ohio	Mi 134	Sept. 13		20.0	7.3	79.3	8.4	11,000	8.1	25	270	
" "	" "	" 22		15.0	7.7	75.8	6.8	2,300	8.1	83		
Miami River - ½ mile Above Piqua, Ohio	Mi 122	Sept. 19		20.5	9.9	109.1	5.8	28	8.2	41		
" "	" "	" 21		20.0	9.3	101.2	3.2	23	8.3	48	245	
" "	" "	" 25		20.0	8.3	90.6	3.8	240	8.3	43	235	
Miami River-Br. U.S. route #25 - Above Piqua, Ohio	Mi 121.5	Sept. 13	74	21.0	10.8	120.1	2.1	93	8.3	35	257	
Miami River - lower city limits - Piqua, Ohio	Mi 120	Sept. 13	74	21.0	7.6	84.6	7.6	2,400	8.1	25	260	
Miami River - 1 mile below city limits Piqua, Ohio	Mi 119	Sept. 19		21.5	5.2	58.9	11.8	24,000	7.8	64		
" "	" "	" 21		20.0	4.5	49.0	20.5	2,300	6.7	155	150	
" "	" "	" 25		21.0	6.1	67.5	14.4	9,300	7.4	65	200	
Miami River - above Troy, Ohio	Mi 113.5	Sept. 14		27.0	10.7	132.2	5.0	36	8.3	35	254	
" "	" "	" 18		21.0	7.9	87.7	5.4	110	8.2	35		
" "	" "	" 22		20.5	9.8	108.4	4.8	36	8.2	34	235	
Miami River-Bridge on Route #70 - below Troy, Ohio	Mi 113	Sept. 14	80	27.5	7.1	88.7	3.6	43	8.0	25	259	
Miami River - ½ mile Below Troy, Ohio	Mi 112.8	Sept. 22	102	19.0	8.1	86.4	5.2	93	8.4	54		
Miami River - ½ mile Below Troy, Ohio	Mi 112.5	Sept. 18	100	21.5	11.4	127.6	8.4	240	8.3	20		
Miami River - upper edge Tippecanoe City, Ohio	Mi 105	Sept. 15		22.5	6.0	68.1	5.4	23	7.9	48	255	
" "	" "	" 18		19.5	10.5	113.6	6.0	91	8.1	42		
Miami River-Bridge R 70 Below Tippecanoe City	Mi 104	Sept. 15		24.0	4.6	54.4	4.5	460	7.8	37	260	
" "	" "	" 18		19.5	7.8	84.7	5.5	1,100	8.1	40		

TABLE Mi-7 MIAMI RIVER BASIN

OHIO RIVER POLLUTION SURVEY
LABORATORY DATA

SUMMARY OF INDIVIDUAL RESULTS

Sampling Point		Mileage From Mouth		Date 1939		Average Discharge c.f.s.	Temp. °C	Dissolved Oxygen p.p.m.	Dissolved Oxygen % Sat.	5 Day B.O.D. p.p.m.	Coliform M.P.N. Per ml.	pH	Turbidity p.p.m.	Alkalinity p.p.m.	Hardness p.p.m.
Miami River Needmore Road Bridge Above Dayton, Ohio		Mi	89.5	July	6		—	5.3	—	2.0	230		500	180	
"	"	"	"	"	13		23.3	6.5	75.3	1.3	23		100	250	
"	"	"	"	"	19		20.0	7.5	81.8	3.1	230		110	250	
"	"	"	"	"	28		25.5	7.9	95.2	4.2	230		50	250	
"	"	"	"	Aug.	3		22.8	6.2	71.2	4.0	23		80	180	
"	"	"	"	"	9		23.3	7.2	83.4	7.3	230		95	250	
"	"	"	"	"	17		24.4	7.2	85.0	5.6	230		30	280	
"	"	"	"	"	24		22.2	5.7	64.8	2.3	2,300		50	230	
"	"	"	"	"	31		21.7	9.6	108.1	4.0	230		90	300	
"	"	"	"	Sept.	7		23.3	8.5	98.5	5.3	230		95	260	
"	"	"	"	"	14		23.9	9.1	106.5	8.3	23		90	280	
"	"	"	"	"	21		19.4	6.9	74.4	9.4	0		70	260	
"	"	"	"	"	28		17.2	8.7	89.7	5.3	0		55	260	
"	"	"	"	Oct.	12		16.0	8.3		3.2	0		60	260	
"	"	"	"	"	19		12.0	9.7		3.4	23		25	290	
"	"	"	"	"	26		14.0	7.7		3.6	23		40	280	
"	"	"	"	Nov.	2		7.0	8.6		4.3	230		25	260	
"	"	"	"	"	9		4.0	10.4		3.3	230		15	260	
"	"	"	"	"	15		6.0	9.6		2.5	23		10	280	
"	"	"	"	"	24		5.0	9.3		2.2	23		85	300	
"	"	"	"	"	30		3.0	10.9		2.7	23		10	260	
"	"	"	"	Dec.	7		4.0	11.5		3.9	230		25	290	
"	"	"	"	"	12		3.0	9.2		0.4	23		15	280	
"	"	"	"	"	21		2.0	12.0		2.3	230		75	280	
"	"	"	"	"	28		0.0	12.6		1.4	230		40	290	
Miami River New Troy Pike Bridge Above Dayton, Ohio		Mi	87	July	6		—	4.8	—	4.5	230		500	170	
"	"	"	"	"	13		23.3	6.8	78.8	0.5	0		98	250	
"	"	"	"	"	19		21.1	7.6	84.6	2.8	230		100	250	
"	"	"	"	"	28		25.5	9.8	118.1	2.5	230		120	230	
"	"	"	"	Aug.	3		23.9	9.1	106.6	3.5	230		90	190	
"	"	"	"	"	9		22.2	7.8	88.6	7.3	230		85	240	
"	"	"	"	Aug.	17		24.4	8.0	94.5	6.4	230		50	280	
"	"	"	"	"	24		23.9	6.4	74.9	1.0	230		75	230	
"	"	"	"	"	31		23.3	11.6	134.4	7.3	230		95	260	
"	"	"	"	Sept.	7		24.4	9.0	106.3	9.5	230		85	290	
"	"	"	"	"	14		24.4	11.6	136.9	9.0	23		85	290	
"	"	"	"	"	21		19.4	9.2	99.1	5.6	230		70	290	
"	"	"	"	"	28		17.2	12.6	129.9	8.9	23		65	240	
"	"	"	"	Oct.	12		16.0	8.5		2.6	230		50	260	
"	"	"	"	"	19		13.0	11.0		3.1	23		25	280	
"	"	"	"	"	26		15.0	8.7		4.2	23		30	290	
"	"	"	"	Nov.	2		7.0	8.5		2.9	230		15	280	
"	"	"	"	"	9		4.0	10.2		3.2	230		10	260	
"	"	"	"	"	15		6.0	11.6		1.7	23		10	270	
"	"	"	"	"	24		5.0	9.3		2.7	0		20	290	
"	"	"	"	"	30		4.0	10.8		2.7	0		10	260	
"	"	"	"	Dec.	7		4.0	11.6		2.1	23		10	290	

TABLE Mi-7 MIAMI RIVER BASIN

OHIO RIVER POLLUTION SURVEY
LABORATORY DATA

SUMMARY OF INDIVIDUAL RESULTS

Sampling Point	Mileage From Mouth	Date 1939	Average Discharge c.f.s.	Temp. °C	Dissolved Oxygen p.p.m.	Dissolved Oxygen % Sat.	5 Day B.O.D. p.p.m.	Coliform M.P.N. Per ml.	pH	Turbidity p.p.m.	Alkalinity p.p.m.	Hardness p.p.m.
MIAMI RIVER New Troy Pike Bridge Above Dayton, Ohio	Mi 87	Dec. 14		2.0	11.7		3.7	23		10	280	
" "	" "	" 21		2.0	12.6		2.3	230		50	300	
" "	" "	" 28		0.0	12.3		0.5	23		25	280	
Stillwater River–½ mi. Above Covington, Ohio	MiSt 120	Sept. 15		23.0	5.5	63.2	2.2	2	8.0	51	292	
" "	" "	" 20		15.0	6.4	61.5	2.1	24	8.0	70		
Dismal Creek-Bel.Sewage Below Union City, Ohio	MiStGB 139	Aug. 15	2	28.0	6.3	79.4	4.8	460	7.8	10	236	264
" "	" "	" 22	1	20.5	0.8	9.3	9.1	11,000	7.9	8	402	
" "	" "	" 29	1	24.0	1.6	18.3	13.2	46,000	7.7	12	379	
Greenville Creek 1 mi. west of Greenville, O.	MiStG 140	Sept. 13		19.5	6.1	65.7	2.9	15	8.0	37	282	
" "	" "	" 20		15.0	6.9	67.6	3.4	23	8.1	49		
" "	" "	" 25		19.0	9.4	98.9	3.4	43	8.2	28	290	
Greenville Creek-1½ mi. east - Br. U.S. #36 Greenville, Ohio	MiStG 138	Sept. 13		20.0	3.8	41.8	4.2	11,000	7.8	25	269	
" "	" "	" 20		15.5	3.7	36.4	5.1	2,300	7.8	49		
" "	" "	" 25		20.5	5.8	64.3	2.3	360	7.8	37	270	
Stillwater River - 1mi. Below Covington, Ohio	MiSt 118	Sept. 15		23.0	3.2	37.2	2.7	2,900	7.8	28	274	
" "	" "	" 20		17.0	4.8	49.7	2.1	910	7.9	33		
Stillwater River ½ mi. Above West Milton, O.	MiSt 104	Sept. 15		22.5	8.2	93.1	3.0	23	8.0	37	263	
" "	" "	" 20		18.5	7.1	75.4	3.0	46	8.1	58		
Stillwater R. 3/4 mi. Bel. West Milton, Ohio	MiSt 103	Sept. 15		22.5	6.9	78.6	3.0	93	7.9	51	255	
" "	" "	" 20		19.5	7.6	82.2	4.2	93	7.9	64		
Stillwater River Siebenthaler Bridge Above Dayton, Ohio	MiSt 89.5	July 6		—	7.5	—	2.1	0		15	280	
" "	" "	" 13		24.4	7.0	82.6	0.7	0		10	240	
" "	" "	" 19		21.1	7.3	81.3	2.1	23		90	250	
" "	" "	July 28		25.5	7.6	91.6	2.1	230		50	230	
" "	" "	Aug. 3		23.3	7.3	84.6	1.5	23		85	210	
" "	" "	" 9		24.4	7.6	89.7	7.3	230		87	270	
" "	" "	" 17		24.4	8.2	96.8	4.4	23		30	240	
" "	" "	" 24		23.9	9.4	110.1	1.0	0		35	240	
" "	" "	" 31		22.8	8.9	102.2	2.5	230		25	250	
" "	" "	Sept. 7		26.1	7.5	91.5	5.8	23		60	260	
" "	" "	" 14		24.4	7.4	87.4	Lost	23		30	250	
" "	" "	" 21		19.4	7.7	83.0	2.9	23		15	240	
" "	" "	" 28		17.2	7.9	81.4	2.7	0		25	270	
" "	" "	Oct. 12		15.0	6.9		0.9	0		50	250	
" "	" "	" 19		13.0	10.2		4.1	23		15	280	
" "	" "	" 26		15.0	10.2		5.2	0		15	250	
" "	" "	Nov. 2		7.0	10.6		2.4	0		15	250	
" "	" "	" 9		4.0	11.3		3.2	230		0	260	
" "	" "	" 15		6.0	11.6		2.1	0		10	260	

TABLE M1-7 MIAMI RIVER BASIN

OHIO RIVER POLLUTION SURVEY
LABORATORY DATA

SUMMARY OF INDIVIDUAL RESULTS

Sampling Point	Mileage from Mouth	Date 1939	Average Discharge c.f.s.	Temp. °C	Dissolved Oxygen p.p.m.	Dissolved Oxygen % Sat.	5 Day B.O.D. p.p.m.	Coliform M.P.N. Per ml.	pH	Turbidity p.p.m.	Alkalinity p.p.m.	Hardness p.p.m.
Stillwater River Siebenthaler Bridge Above Dayton, Ohio	MiSt 89.5	Nov. 24		5.0	11.8		2.4	23		10	260	
" "	" "	" 30		4.0	10.4		1.2	0		10	260	
"	" "	Dec. 7		5.0	12.9		2.7	2		10	270	
" "	" "	" 14		3.0	12.4		1.7	23		10	270	
" "	" "	" 21		1.0	13.0		1.8	23		25	270	
" "	" "	" 28		0.0	13.5		0.6	2		25	280	
Stillwater River Peter's Pike Bridge Above Dayton, Ohio	MiSt 86.0	July 6		—	6.4	—	1.7	230		15	270	
" "	" "	" 13		23.3	6.5	75.3	1.0	230		10	250	
" "	" "	" 19		21.1	7.0	78.0	2.4	23		110	250	
" "	" "	" 28		25.5	7.0	84.3	Depl.	23		25	240	
" "	" "	Aug. 3		22.2	6.4	72.7	3.0	23		100	190	
" "	" "	" 9		23.3	6.8	86.2	7.7	230		85	260	
" "	" "	" 17		24.4	7.3	86.2	3.6	23		50	260	
" "	" "	" 24		23.9	7.4	86.7	1.3	23		35	260	
" "	" "	" 31		21.7	7.8	87.8	4.0	23		85	260	
" "	" "	Sept. 7		24.4	7.5	88.5	2.3	230		100	270	
" "	" "	" 14		23.3	7.1	82.3	2.8	23		30	260	
" "	" "	" 21		17.8	6.8	71.0	2.2	230		20	250	
" "	" "	" 28		21.1	7.7	85.7	2.0	230		10	300	
" "	" "	Oct. 12		15.0	7.9		2.6	230		90	240	
" "	" "	" 19		13.0	10.1		3.0	2		30	260	
" "	" "	" 26		14.0	8.5		3.9	0		30	250	
" "	" "	Nov. 2		7.0	10.2		2.2	230		15	280	
" "	" "	" 9		3.0	11.6		1.7	23		15	270	
" "	" "	" 15		6.0	10.9		1.8	0		10	260	
" "	" "	" 24		5.0	11.1		1.8	23		10	270	
" "	" "	" 30		4.0	11.3		1.7	23		15	270	
" "	" "	Dec. 7		3.0	12.3		1.9	23		10	260	
" "	" "	" 14		2.0	13.5		4.0	0		10	290	
" "	" "	" 21		2.0	12.7		1.9	23		25	270	
" "	" "	" 28		1.0	13.0		0.7	23		25	280	
Mad River - Br. U.S.#36 Above Urbana, Ohio	MiM 127	Sept. 14		20.0	8.9	97.5	1.4	15	7.9	10	299	
" "	" "	" 18		13.5	8.5	80.7	1.4	15	7.9	18		
Mad River - 1 mi. from route O-55 below Urbana, Ohio	MiM 125	Sept. 14		21.5	7.9	89.0	2.6	430	7.9	10	303	
" "	" "	" 18		13.5	8.6	81.9	1.9	7	7.8	10		
Mad River-Br. Rte. #70 Above Springfield, Ohio	MiM 112	Sept. 12		18.5	8.3	87.8	2.4	210	7.8	25	248	
" "	" "	" 18		14.0	8.0	77.0	1.9	210	8.0	10		
" "	" "	" 22		12.0	8.4	77.7	2.0	36	7.9	5	250	
Mad River - ½ mi South off Route 40 - below Springfield, Ohio	MiM 111	Sept. 12		18.5	6.1	64.8	4.1	240	7.8	30	289	
" "	" "	" 18		16.0	5.3	53.1	4.4	230	7.6	43		
Mad River - ¼ mi. south off route #40 Below Springfield, Ohio	MiM 110.5	Sept. 12	199	18.0	5.6	58.7	3.8	1,100	7.8	52	293	
Mad River - Bridge on Route #40 Below Springfield, Ohio	MiM 110	Sept. 12	190	16.0	8.4	84.2	2.4	460	7.8	10	287	

TABLE M1-7 MIAMI RIVER BASIN

OHIO RIVER POLLUTION SURVEY
LABORATORY DATA

SUMMARY OF INDIVIDUAL RESULTS

Sampling Point	Mileage From Mouth	Date 1939	Average Discharge c.f.s.	Temp. °C	Dissolved Oxygen p.p.m.	Dissolved Oxygen % Sat.	5 Day B.O.D. p.p.m.	Coliform M.P.N. Per ml	pH	Turbidity p.p.m.	Alkalinity p.p.m.	Hardness p.p.m.
Mad River Harshmanville Bridge Dayton, Ohio	M&M 85	July 6		—	6.6	—	5.3	230		100	270	
" "	" "	" 13		21.1	6.3	70.2	2.1	230		90	300	
" "	" "	" 19		21.1	7.8	86.9	2.8	230		75	260	
" "	" "	" 28		22.2	9.2	104.5	2.3	23		10	270	
" "	" "	Aug. 3		23.3	6.5	75.3	4.0	23		85	290	
" "	" "	" 9		21.1	7.9	88.0	6.8	230		85	300	
" "	" "	" 17		22.8	9.3	106.8	4.0	23		25	300	
" "	" "	" 24		20.0	9.1	99.2	0.8	23		25	290	
" "	" "	" 31		20.0	10.9	118.9	2.3	23		25	270	
" "	" "	Sept. 7		22.2	10.4	118.2	1.3	230		20	310	
" "	" "	" 14		21.1	9.8	104.3	2.3	0		15	300	
" "	" "	" 21		18.3	8.4	88.6	1.0	23		0	300	
" "	" "	" 28		16.1	9.2	92.7	1.8	23		15	280	
" "	" "	Oct. 12		15.0	8.3		1.4	23		0	280	
" "	" "	" 19		12.0	13.0		4.1	23		0	300	
" "	" "	" 26		14.0	6.7		Lost	230		40	180	
" "	" "	Nov. 2		7.0	10.4		2.0	0		10	310	
" "	" "	" 9		5.0	12.1		1.8	23		0	310	
" "	" "	" 15		5.0	11.0		1.7	23		15	310	
" "	" "	" 24		6.0	11.6		1.8	23		15	280	
" "	" "	" 30		6.0	9.6		2.4	0		10	310	
" "	" "	Dec. 7		5.0	11.8		1.9	230		10	300	
" "	" "	" 14		4.0	10.7		2.0	23		10	280	
" "	" "	" 21		3.0	12.3		1.2	230		85	310	
" "	" "	" 28		2.0	11.8		0.4	2,300		25	290	
Wolf Creek [illegible] Bridge Dayton, Ohio	M&W 85	July 6		—	6.5	—	0.2	0		10	250	
" "	" "	" 13		21.7	6.7	75.4	0.2	0		90	260	
" "	" "	" 19		20.0	6.6	72.0	1.7	23		125	220	
" "	" "	" 28		23.3	6.3	73.0	1.3	230		90	240	
" "	" "	Aug. 3		22.8	6.9	79.2	4.0	230		50	190	
" "	" "	" 9		22.2	6.4	72.7	3.5	23		25	240	
" "	" "	Aug. 17		22.8	6.7	76.9	2.0	23		25	240	
" "	" "	" 24		20.0	6.8	74.2	1.0	230		25	280	
" "	" "	" 31		21.1	7.0	78.0	0.8	230		65	260	
" "	" "	Sept. 7		21.7	7.1	80.0	0.5	230		90	240	
" "	" "	" 14		23.3	7.1	82.3	1.0	230		25	240	
" "	" "	" 21		17.8	7.2	75.2	1.0	23		10	260	
" "	" "	" 28		21.1	6.7	74.6	2.1	23		90	290	
" "	" "	Oct. 12		15.0	6.6		0.6	0		10	290	
" "	" "	" 19		13.0	8.1		1.5	23		30	270	
" "	" "	" 26		14.0	8.0		2.0	23		30	250	
" "	" "	Nov. 2		8.0	9.2		1.3	23		25	270	
" "	" "	" 9		5.0	10.0		0.6	23		10	270	
" "	" "	" 15		6.0	11.4		1.8	23		15	280	
" "	" "	" 24		6.0	10.0		1.6	0		10	250	
" "	" "	" 30		6.0	9.2		0.9	0		25	270	

TABLE Mi-7 MIAMI RIVER BASIN

OHIO RIVER POLLUTION SURVEY
LABORATORY DATA

SUMMARY OF INDIVIDUAL RESULTS

Sampling Point	Mileage from Mouth	Date 1939	Average Discharge c.f.s.	Temp. °C	Dissolved Oxygen p.p.m.	Dissolved Oxygen % Sat.	5 Day B.O.D. p.p.m.	Coliform M.P.N. Per ml	pH	Turbidity p.p.m.	Alkalinity p.p.m.	Hardness p.p.m.
Wolf Creek-Gettysburg Bridge-Dayton, Ohio	MiW 85	Dec. 7		4.0	10.6		1.5	23		25	250	
" "	" "	" 14		3.0	12.5		2.6	0		20	270	
" "	" "	" 21		3.0	12.0		1.1	23		50	280	
" "	" "	" 28		2.0	12.0		0.9	0		30	280	
Miami R. Broadway St. Bridge-Dayton, Ohio	Mi 83	June 14	1,340	17.8	8.0		3.9					
" "	" "	" 28	1,960	24.4	7.8		2.0				288	
" "	" "	July 5	1,250	23.3	7.4		7.0				290	
" "	" "	" 12	930	23.3	7.4		6.0				250	
" "	" "	" 20	930	21.1	7.5		3.0				240	
" "	" "	" 26	612	--	6.2	--	2.5				250	
" "	" "	Aug. 4	1,480	23.3	7.1		7.5				210	
" "	" "	" 10	612	23.3	7.2		7.7				240	
" "	" "	" 16	505	24.4	6.3		3.2				260	
" "	" "	" 23	612	21.7	6.8		3.5				250	
" "	" "	" 30	400	26.7	6.8		7.8				230	
" "	" "	Sept. 6	400	27.2	6.1		3.3				240	
" "	" "	" 13	340	25.0	5.8		8.3				250	
" "	" "	" 20	297	24.4	6.9		6.0				250	
" "	" "	" 27	215	21.1	7.2		4.0				260	
" "	" "	Oct. 4	255	18.3	8.1		5.0				240	
" "	" "	" 11	255	22.2	6.0		4.8				250	
" "	" "	" 18	255	14.4	10.7		6.5				250	
" "	" "	" 27	865	19.4	6.8		4.9				230	
" "	" "	Nov. 1	560	10.0	9.3		4.1				260	
" "	" "	" 8	380	3.9	10.1		6.5				270	
" "	" "	" 16	340	3.3	10.1		5.7				280	
" "	" "	" 22	420	3.3	10.0		5.1				260	
" "	" "	" 29	505	6.7	13.1		4.8				260	
" "	" "	Dec. 6	463	6.7	12.2		5.3				260	
" "	" "	" 13	360	7.8	11.2		5.1				260	
" "	" "	" 20	380	8.9	10.5		4.8				270	
Miami R. ½ mi. below sewer-Dayton, Ohio	Mi 82	June 14		18.3	7.7		5.4					
" "	" "	" 28		24.4	7.6		1.6				323	
" "	" "	July 5		23.3	7.2		8.3				310	
" "	" "	" 12		23.3	7.2		3.5				330	
" "	" "	" 20		21.1	7.3		12.8				320	
" "	" "	" 26		—	6.5	—	2.2				270	
" "	" "	Aug. 4		23.3	6.9		8.0				230	
" "	" "	" 10		23.3	7.1		11.5				280	
" "	" "	" 16		23.9	6.3		4.4				280	
" "	" "	" 23		22.2	6.6		3.3				280	
" "	" "	" 30		26.1	6.7		9.3				280	
" "	" "	Sept. 6		27.8	6.4		3.8				270	
" "	" "	" 13		25.0	7.9		13.0				290	
" "	" "	" 20		23.3	7.3		10.8				300	
" "	" "	" 27		20.6	7.1		12.5				310	
" "	" "	Oct. 4		18.3	6.6		8.5				270	

TABLE Mi-7 MIAMI RIVER BASIN

OHIO RIVER POLLUTION SURVEY
LABORATORY DATA

SUMMARY OF INDIVIDUAL RESULTS

Sampling Point	Mileage From Mouth	Date 1939	Average Discharge c.f.s.	Temp. °C	Dissolved Oxygen		5 Day B.O.D. p.p.m.	Coliform M.P.N. Per ml	pH	Turbidity p.p.m.	Alkalinity p.p.m.	Hardness p.p.m.
					p.p.m.	% Sat.						
Miami R. ½ mi. below sewer-Dayton, Ohio	Mi 82	Oct. 11		20.6	5.9		5.8				280	
" "	" "	" 18		14.4	9.6		9.2				290	
" "	" "	" 27		19.4	6.2		11.0				270	
" "	" "	Nov. 1		13.3	8.4		8.0				300	
" "	" "	" 8		11.7	8.7		3.6				310	
" "	" "	" 16		8.9	9.3		4.0				300	
" "	" "	" 22		10.6	9.9		4.2				270	
" "	" "	" 29		10.0	11.0		8.1				270	
" "	" "	Dec. 6		10.0	10.2		7.4				280	
" "	" "	" 13		10.0	9.8		8.4				280	
" "	" "	" 20		10.0	9.3		8.7				290	
Miami River - 2½ miles below sewer Dayton, Ohio	Mi 80	June 14		18.3	7.6		4.2					
" "	" "	" 28		24.4	7.8		2.0				350	
" "	" "	July 5		23.3	7.0		9.5				310	
" "	" "	" 12		23.3	7.2		3.8				260	
" "	" "	July 20		21.1	7.2		5.0				250	
" "	" "	" 26		--	5.6	--	2.2				250	
" "	" "	Aug. 4		23.3	6.8		6.8				230	
" "	" "	" 10		23.3	6.7		7.7				270	
" "	" "	" 16		24.4	6.2		3.2				270	
" "	" "	" 23		22.2	6.4		3.5				260	
" "	" "	" 30		26.1	6.8		8.0				280	
" "	" "	Sept. 6		26.1	5.3		5.3				250	
" "	" "	" 13		23.3	5.9		8.0				260	
" "	" "	" 20		23.3	6.3		7.8				270	
" "	" "	" 27		20.6	6.5		5.0				270	
" "	" "	Oct. 4		17.2	7.5		6.0				260	
" "	" "	" 11		21.1	5.0		5.3				270	
" "	" "	" 18		13.3	9.2		4.7				280	
" "	" "	" 27		18.3	6.4		4.4				240	
" "	" "	Nov. 1		10.0	8.9		2.6				280	
" "	" "	" 8		7.2	9.4		4.1				290	
" "	" "	" 16		7.8	9.9		4.2				290	
" "	" "	" 22		7.8	9.6		4.6				270	
" "	" "	" 29		5.6	11.0		3.9				260	
" "	" "	Dec. 6		6.7	10.6		3.3				270	
" "	" "	" 13		7.8	9.6		4.7				260	
" "	" "	" 20		8.9	9.0		3.7				280	
Miami River - 6 miles below sewer - Dayton	Mi 77.5	June 14		17.8	7.5		3.8					
" "	" "	" 28		24.4	7.3		1.8				300	
" "	" "	July 5		23.3	6.9		9.7				315	
" "	" "	" 12		23.3	7.2		6.8				260	
" "	" "	" 20		21.1	7.0		5.3				260	
" "	" "	" 26		--	5.5	--	2.5				270	
" "	" "	Aug. 4		23.3	6.5		7.3				210	

TABLE M1-7 MIAMI RIVER BASIN

OHIO RIVER POLLUTION SURVEY
LABORATORY DATA

SUMMARY OF INDIVIDUAL RESULTS

Sampling Point	Mileage From Mouth	Date 1939	Average Discharge c.f.s.	Temp. °C	Dissolved Oxygen p.p.m.	Dissolved Oxygen % Sat.	5 Day B.O.D. p.p.m.	Coliforms M.P.N. Per ml	pH	Turbidity p.p.m.	Alkalinity p.p.m.	Hardness p.p.m.
Miami River - 5 miles below sewer - Dayton	Mi 77.5	Aug. 10		23.3	6.6		6.2				260	
" "	" "	" 16		24.4	5.8		5.2				270	
" "	" "	" 23		22.2	6.2		5.8				250	
" "	" "	" 30		26.1	7.1		8.3				260	
" "	" "	Sept. 6		26.1	4.5		6.5				260	
" "	" "	" 13		23.3	4.5		6.0				270	
" "	" "	" 20		23.3	5.2		6.0				290	
" "	" "	" 27		20.6	4.9		4.8				280	
" "	" "	Oct. 4		17.2	6.6		8.3				250	
" "	" "	" 11		21.1	4.3		3.0				280	
" "	" "	" 18		13.3	7.7		3.6				280	
" "	" "	" 27		18.3	6.6		4.5				240	
" "	" "	Nov. 1		9.4	8.9		3.4				290	
" "	" "	" 8		9.4	9.1		3.5				290	
" "	" "	" 16		8.3	10.2		4.2				290	
" "	" "	" 22		7.8	9.2		4.4				260	
" "	" "	Nov. 29			6.7	10.8	3.2				260	
" "	" "	Dec. 6		5.6	10.5		3.3				260	
" "	" "	" 13		7.8	9.9		4.9				270	
" "	" "	" 20		8.9	9.3		4.6				280	
Miami River - 6 miles below sewer - Dayton, O.	Mi 76.5	June 14		18.3	7.1		4.6					
" "	" "	" 28		24.4	6.9		2.0				337	
" "	" "	July 5		23.3	6.7		6.8				320	
" "	" "	" 12		23.3	6.8		5.0				260	
" "	" "	" 20		21.1	7.0		5.0				250	
" "	" "	" 26		—	5.7		3.0				270	
" "	" "	Aug. 4		23.3	6.4		4.2					
" "	" "	" 10		23.9	6.7		6.2				260	
" "	" "	" 16		25.6	5.4		6.4				280	
" "	" "	" 23		23.3	6.1		3.8				260	
" "	" "	" 30		26.1	5.7		5.3				260	
" "	" "	Sept. 6		26.1	5.6		3.3				250	
" "	" "	Sept. 13		23.3	5.2		7.3				260	
" "	" "	" 20		23.3	6.2		5.8				280	
" "	" "	" 27		20.6	6.3		4.0				270	
" "	" "	Oct. 4		17.2	6.3		8.0				250	
" "	" "	" 11		21.1	4.3		2.0				270	
" "	" "	" 18		13.3	8.2		5.6				270	
" "	" "	" 27		18.3	6.9		4.0				240	
" "	" "	Nov. 1		10.0	8.5		3.2				270	
" "	" "	" 8		9.4	8.5		3.5				280	
" "	" "	" 16		8.9	11.2		5.6				280	
" "	" "	" 22		8.9	8.8		4.4				260	
" "	" "	" 29		6.7	10.9		4.0				260	
" "	" "	Dec. 6		6.1	10.3		4.1				260	
" "	" "	" 13		7.8	10.4		4.1				260	
" "	" "	" 20		8.9	10.0		5.8				280	

TABLE Mi-7 MIAMI RIVER BASIN

OHIO RIVER POLLUTION SURVEY
LABORATORY DATA

SUMMARY OF INDIVIDUAL RESULTS

Sampling Point	Mileage From Mouth	Date 1939	Average Discharge c.f.s.	Temp. °C	Dissolved Oxygen p.p.m.	Dissolved Oxygen % Sat.	5 Day B.O.D. p.p.m.	Coliform M.P.N. Per ml	pH	Turbidity p.p.m.	Alkalinity p.p.m.	Hardness p.p.m.
Miami River - 1½ miles below Dayton sewage West Carrollton, Ohio	Mi 75	June 14		17.8	7.1		6.0					
" "	" "	" 28		25.6	6.9		2.3				288	
" "	" "	July 5		23.3	6.4		13.5				320	
" "	" "	" 12		23.3	6.7		5.0				270	
" "	" "	" 20		21.1	6.9		7.0				250	
" "	" "	" 26		13.9	6.2		2.7				260	
" "	" "	Aug. 4		23.3	6.3		5.3				210	
" "	" "	" 10		24.4	6.4		9.7				250	
" "	" "	" 16		25.0	5.5		6.8				280	
" "	" "	" 23		23.3	6.2		4.5				260	
" "	" "	" 30		26.1	5.5		7.0				260	
" "	" "	Sept. 6		26.1	6.1		6.0				250	
" "	" "	" 13		23.3	6.0		7.5				260	
" "	" "	" 20		23.3	6.2		5.8				280	
" "	" "	" 27		26.1	6.6		6.3				280	
" "	" "	Oct. 4		17.2	7.0		7.8				260	
" "	" "	" 11		21.1	4.9		6.5				270	
" "	" "	" 18		12.8	9.3		4.7				270	
" "	" "	" 27		18.3	6.6		4.8				240	
" "	" "	Nov. 1		10.0	8.3		3.0				280	
" "	" "	" 8		9.4	8.0		2.9				250	
" "	" "	" 16		8.9	10.6		4.7				290	
" "	" "	" 22		8.9	8.7		4.2				260	
" "	" "	" 29		6.7	11.4		5.3				260	
" "	" "	Dec. 6		6.7	10.8		4.0				260	
" "	" "	" 13		7.8	11.8		5.0				260	
" "	" "	" 20		8.9	9.7		5.8				280	
Miami River - above Miamisburg, Ohio	Mi 71.6	June 20		22.5	7.6	87.0	3.8	930				
" "	" "	" 27		25.0	7.5	89.5	2.5	230				
" "	" "	July 11		25.0	7.3	87.4	1.9	930				
" "	" "	" 20		22.5	7.3	83.8	2.2	2,400				
" "	" "	Aug. 3		24.5	7.2	85.7	1.9	230				
" "	" "	" 17		26.5	6.8	83.9	3.0	91	8.0			
" "	" "	" 31		23.5	9.0	104.1	3.5	140	8.1			
" "	" "	Sept. 14		24.5	7.4	87.0	3.3	110	8.0			
" "	" "	" 28		21.0	9.5	105.7	4.0	460	8.2			
" "	" "	Oct. 12		18.5	6.4	68.1	2.4	930	7.8			
" "	" "	" 26		17.0	7.4	75.6	4.1	430	8.0			
" "	" "	Nov. 9	410	6.5	11.7	99.6	2.2	390	7.6			
" "	" "	Dec. 6		7.5	11.8	97.8	2.2	150				
" "	" "	" 20		7.0	9.6	78.6	2.7	36	7.8			
" "	" "	1940 Jan. 5		1.0	13.4	94.0	3.7	91	7.9			
" "	" "	" 17		0.0	13.6	92.9	4.5	930	7.6			
" "	" "	Feb. 2		2.0	11.7	84.7	3.2	91	8.1			
" "	" "	" 12		3.0	12.8	95.0	6.6	430	7.6			
" "	" "	" 19		3.5	12.7	95.5	4.6	1,100	7.8			
" "	" "	" 26		3.0	13.2	98.1	1.9	93	8.0			

TABLE Mi-7 MIAMI RIVER BASIN

OHIO RIVER POLLUTION SURVEY
LABORATORY DATA

SUMMARY OF INDIVIDUAL RESULTS

Sampling Point	Mileage From Mouth	Date 1940	Average Discharge c.f.s.	Temp. °C	Dissolved Oxygen p.p.m.	Dissolved Oxygen % Sat.	5 Day B.O.D. p.p.m.	Coliform M.P.N. Per ml	pH	Turbidity p.p.m.	Alkalinity p.p.m.	Hardness p.p.m.
Miami River - Above Miamisburg, Ohio	Mi 71.6	Mar. 1		6.0	12.7	101.4	2.7	93				
" "	" "	" 7		5.5	12.5	98.9	1.4	93	7.7			
" "	" "	" 13		6.5	11.8	95.9	4.6	1,100	7.8			
" "	" "	" 20		8.5	10.5	89.5	2.4	91	8.0			
" "	" "	" 28		10.0	11.3	99.7	2.8	91	8.0			
" "	" "	Apr. 5		15.0	9.9	97.5	2.8	23	8.1			
Miami River - bridge in town-Miamisburg, O.	Mi 69.0	1939 Feb. 21		5.0	11.6	90.2	3.8	1,100				
" "	" "	" 27		3.0	12.4	92.2	3.9	240				
" "	" "	Mar. 3		2.5	12.8	93.9	2.7	150				
" "	" "	" 7		5.5	12.4	97.7	2.2	36				
" "	" "	" 10		6.0	11.1	88.9	4.5	1,100				
" "	" "	" 13		6.0	11.7	93.5	4.5	460				
" "	" "	" 15		8.0	11.2	94.0	2.8	240				
" "	" "	" 20		5.5	12.0	94.5	2.6	290				
" "	" "	" 23		9.0	10.5	90.3	5.0	1,100				
" "	" "	Mar. 27		12.5	9.3	86.9	3.8	30				
" "	" "	" 31		7.0	11.1	91.3	3.7	460				
" "	" "	Apr. 4		9.5	10.4	90.5	4.8	43				
" "	" "	" 7		6.5	11.4	92.3	4.4	43				
" "	" "	" 10		10.0	10.7	94.3	3.2	93				
" "	" "	" 12		8.0	10.9	91.9	4.1	1,100				
" "	" "	" 17		10.0	10.8	95.2	3.6	93				
" "	" "	" 20		9.0	11.1	95.9	2.4	150				
" "	" "	" 26		16.5	8.4	84.9	3.5	1,100				
" "	" "	" 28		16.5	8.5	86.6	2.4	91				
" "	" "	May 1		13.5	9.5	91.0	1.8	430				
" "	" "	" 4		14.5	9.1	88.7	3.0	930				
" "	" "	" 8		19.5	8.3	90.1	3.7	150				
" "	" "	" 12		17.0	8.4	86.2	5.3	1,500				
" "	" "	" 16		17.5	8.3	86.4	4.8	73				
" "	" "	" 19		21.0	7.6	84.9	6.0	91				
" "	" "	May 22		21.5	6.8	76.8	4.6	23				
" "	" "	" 24		23.0	6.4	73.4	6.8	23				
" "	" "	June 2		24.0	5.9	68.9	5.1	2,400				
" "	" "	" 5		23.0	7.1	81.5	3.7	2,400				
" ""	" "	" 7		25.5	5.9	71.6	5.5	750				
" "	" "	" 13		19.5	7.3	78.7	3.1	230				
" "	" "	" 16		24.0	6.4	75.6	4.8	430				
Miami River below Miamisburg, Ohio	Mi 66.5	June 20		22.0	7.4	84.4	3.4	91				
" "	" "	" 27		25.0	7.0	83.2	3.6	430				
" "	" "	July 11		24.0	6.5	76.2	3.4	2,400				
" "	" "	" 20		22.0	6.7	76.2	3.3	430	7.9			
" "	" "	Aug. 3		24.5	6.4	76.0	2.4	430				
" "	" "	" 17		26.0	5.1	62.0	3.6	430	7.9			
" "	" "	" 31		23.5	5.2	61.0	5.0	1,500	7.9			
" "	" "	Sept. 14		24.5	4.7	55.6	4.9	2,400	7.9			

TABLE Mi-7 MIAMI RIVER BASIN

OHIO RIVER POLLUTION SURVEY
LABORATORY DATA

SUMMARY OF INDIVIDUAL RESULTS

Sampling Point	Mileage From Mouth	Date 1939	Average Discharge c.f.s.	Temp. °C	Dissolved Oxygen p.p.m.	Dissolved Oxygen % Sat.	5 Day B.O.D. p.p.m.	Coliform M.P.N. Per ml	pH	Turbidity p.p.m.	Alkalinity p.p.m.	Hardness p.p.m.
Miami River below Miamisburg, Ohio	Mi 66.5	Sept. 28		20.5	5.8	64.0	6.7	11,000	8.0			
" "	" "	Oct. 12		18.5	4.5	47.4	3.6	360	7.8			
" "	" "	" 26		17.0	5.4	55.9	5.0	910	7.7			
" "	" "	Nov. 9	410	8.0	9.2	77.3	6.1	2,400	7.8			
" "	" "	Dec. 6		6.5	11.5	93.6	5.6	930				
" "	" "	" 20		7.5	8.4	70.1	4.7	2,400	7.8			
" "	" "	1940 Jan. 5		1.0	11.8	83.1	6.4	750	7.8			
" "	" "	" 23		0.0	12.6	86.3	5.1	91				
Miami River - Bridge in Franklin, Ohio	Mi 61.3	1939 June 20		22.5	8.0	90.9	3.9	2,400				
" "	" "	" 27		24.5	7.0	83.0	4.2	230				
Miami River - Above Franklin, Ohio	Mi 61.3	July 11		23.5	7.5	86.9	2.8	230				
" "	" "	" 20		22.0	7.6	85.6	3.1	430	8.2			
" "	" "	Aug. 3		24.5	7.1	84.4	2.3	230				
" "	" "	" 17		26.5	7.5	92.1	4.2	36	8.0			
" "	" "	Aug. 31		23.5	7.6	88.0	3.8	2,400	8.0			
" "	" "	Sept. 14		22.5	7.4	84.0	4.1	110	7.9			
" "	" "	" 28		20.0	10.8	117.9	5.5	46	8.1			
" "	" "	Oct. 12		18.0	7.2	75.8	3.5	230	7.8			
" "	" "	" 26		16.5	7.2	73.1	4.5	150	7.7			
" "	Mi 62.8	Nov. 9	420	7.5	9.0	74.6	3.3	750	7.6			
" "	" "	Dec. 6		6.5	11.0	89.5	4.6	930				
" "	" "	" 20		7.0	8.3	68.4	3.5	150	7.6			
" "	" "	1940 Jan. 5		0.0	12.9	88.4	5.7	36	7.8			
" "	" "	" 23		0.0	13.4	91.9	2.8	230				
Miami River - Below Franklin, Ohio	Mi 59.6	1939 July 11		23.5	6.7	77.6	3.9	2,400				
" "	" "	" 20		22.0	7.0	79.8	2.7	91	7.9			
" "	" "	Aug. 3		25.5	6.3	75.9	3.1	11,000				
" "	" "	" 17		26.5	6.0	74.3	5.5	2,300	7.9			
" "	" "	Aug. 31		24.0	7.0	82.4	5.8	910	7.9			
" "	" "	Sept. 14		26.0	5.6	67.5	5.9	11,000	7.9			
" "	" "	" 28		19.0	6.8	72.2	8.9	11,000	7.9			
" "	" "	Oct. 12		18.0	4.4	46.5	7.2	46,000	7.7			
" "	" "	" 26		16.5	4.1	41.6	8.5	3,600	7.6			
" "	" "	Nov. 9	420	7.5	7.7	64.2	6.6	24,000	7.6			
" "	" "	Dec. 6		5.5	9.8	77.2	6.2	24,000				
" "	" "	" 20		7.0	7.8	64.3	5.4	9,300	7.7			
" "	" "	1940 Jan. 5		0.0	18.6	127.1	18.2	46,000	7.8			
" "	" "	" 17		0.0	13.7	93.9	5.6	430	7.6			
" "	" "	" 23		0.0	13.1	89.4	4.0	360				
" "	" "	Feb. 2		0.0	10.7	73.4	13.8	930	8.0			
" "	" "	" 26		3.0	13.2	98.1	3.6	150	8.0			
" "	" "	Mar. 1		4.5	12.6	96.9	4.7	240				
" "	" "	" 7		4.0	12.6	95.9	3.5	240	7.8			
" "	" "	" 11		6.0	11.6	92.5	9.7	2,400	7.8			

TABLE M1-7 MIAMI RIVER BASIN

OHIO RIVER POLLUTION SURVEY
LABORATORY DATA

SUMMARY OF INDIVIDUAL RESULTS

Sampling Point	Mileage From Mouth		Date 1940	Average Discharge c.f.s.	Temp. °C	Dissolved Oxygen		5 Day B.O.D. p.p.m.	Coliform M.P.N. Per ml	pH	Turbidity p.p.m.	Alkalinity p.p.m.	Hardness p.p.m.
						p.p.m.	% Sat.						
Miami River - Below Franklin, Ohio	M1	59.6	Mar. 20		10.0	10.2	90.0	7.3	930	8.0			
" "	"	"	" 28		9.0	10.5	90.6	9.8	4,600	7.9			
" "	"	"	Apr. 5		13.5	8.6	81.7	6.2	910	8.0			
Twin Creek - Above Germantown, Ohio	M1T	68	1939 Aug. 31	24	21.0	7.6	84.6	1.1	15	7.9			
" "	"	"	Sept. 28	12	17.0	8.4	86.8	0.8	4	8.0			
" "	"	"	Oct. 26	28	15.0	8.0	78.4	1.6	43	7.9			
" "	"	"	Dec. 6		3.5	12.4	93.2	0.9	4				
" "	"	"	1940 Jan. 5		0.0	13.6	93.0	0.2	5	7.8			
Twin Creek - Below Germantown, Ohio	M1T	65.5	Aug. 31	24	20.0	7.6	82.6	1.1	23	7.9			
" "	"	"	Sept.28	12	16.0	8.4	83.9	1.3	24	7.9			
" "	"	"	Oct. 26	28	15.0	8.1	79.8	1.7	43	7.9			
" "	"	"	Dec. 6		4.5	12.4	95.8	1.0	23				
" "	"	"	1940 Jan. 5		0.0	14.0	95.7	0.4	8	7.8			
Twin Creek At Mouth	M1T	59.9	1939 Sept.28	14	18.0	8.8	92.2	2.5	110	8.1			
"	"	"	Oct. 12		15.0	8.8	86.7	1.1	23	7.9			
"	"	"	" 26		16.0	8.9	89.4	1.2	15	8.0			
"	"	"	Nov. 9	21	5.5	12.3	97.6	0.8	8	8.0			
"	"	"	Dec. 6		4.0	12.7	96.7	0.9	9				
"	"	"	" 20		5.0	10.6	82.5	0.5	9	8.0			
"	"	"	1940 Jan. 5		0.0	13.9	95.1	0.6	9	7.8			
Miami River - Above Middletown, Ohio	M1	57	1939 June 19		22.5	7.0	80.3	5.9	4,600				
" "	"	"	" 20		22.5	8.0	91.2	3.6	430				
" "	"	"	June 27		25.0	7.2	86.2	2.7	750				
" "	"	"	" 28		25.0	7.2	86.2	2.6	930				
" "	"	"	July 5		23.5	7.5	87.2	2.3	930				
" "	"	"	" 21		23.0	8.0	92.1	2.2	930	7.9			
" "	"	"	Aug. 4		23.5	7.0	82.0	2.4	150				
" "	"	"	" 18		26.0	8.1	98.8	3.3	430	8.0			
" "	"	"	Sept. 1		22.5	7.2	82.6	4.0	430	8.1			
" "	"	"	" 15		23.5	7.4	86.4	7.4	93	7.4			
" "	"	"	" 29		20.5	12.1	132.9	6.7	36	7.9			
" "	"	"	Oct. 13		12.5	8.6	80.1	3.6	23	7.9			
" "	"	"	" 27		18.5	7.7	82.0	2.6	230	7.7			
" "	"	"	Nov. 10	495	9.0	9.5	81.7	2.4	240	7.9			
" "	"	"	Dec. 7		5.5	11.1	87.7	3.2	1,100				
" "	"	"	" 21		4.5	10.6	82.0	3.0	460	7.8		276	
" "	"	"	1940 Jan. 8		1.0	10.6	74.7	2.7	43	7.6			
" "	"	"	Feb. 2		1.0	10.4	73.4	8.0	240	7.8			

TABLE M1-7 MIAMI RIVER BASIN

OHIO RIVER POLLUTION SURVEY
LABORATORY DATA

SUMMARY OF INDIVIDUAL RESULTS

Sampling Point	Mileage From Mouth	Date 1940	Average Discharge c.f.s.	Temp. °C	Dissolved Oxygen p.p.m.	Dissolved Oxygen % Sat.	5 Day B.O.D. p.p.m.	Coliform M.P.N. Per ml	pH	Turbidity p.p.m.	Alkalinity p.p.m.	Hardness p.p.m.
Miami River - Above Middletown, Ohio	M1 57	Feb. 12		2.5	12.1	88.6	6.3	430	7.6			
" "	" "	" 19		4.0	13.2	100.5	4.5	240	7.8			
Miami River East of Trenton Below Middletown, Ohio	M1 50	1939 Feb. 21		6.0	11.5	92.1	5.3	460				
" "	" "	" 27		3.5	12.7	95.2	3.1	240				
" "	" "	Mar. 3		4.0	12.9	98.0	3.4	460				
" "	" "	" 7		7.0	12.0	98.6	4.6	460				
" "	" "	" 10		6.5	11.1	90.1	5.3	2,400				
" "	" "	" 13		7.5	11.9	99.0	4.7	240				
" "	" "	" 15		8.0	11.3	95.3	3.4	460				
" "	" "	" 20		6.5	12.1	98.1	2.8	1,100				
" "	" "	" 23		9.0	10.5	90.3	5.2	2,400				
" "	" "	" 27		11.5	9.4	85.4	5.4	1,500				
" "	" "	" 31		--	11.0	--	5.1	230				
" "	" "	Apr. 4		9.5	10.4	90.3	4.5	390				
" "	" "	" 7		7.0	11.1	91.1	5.6	240				
" "	" "	Apr. 10		10.5	11.0	98.3	2.6	93				
" "	" "	" 12		8.5	10.6	90.1	4.8	460				
" "	" "	" 17		11.0	10.8	97.4	3.9	240				
" "	" "	" 20		10.0	11.1	98.2	3.3	460				
" "	" "	" 26		17.0	8.4	85.8	4.0	930				
" "	" "	" 28		17.0	8.2	84.7	3.4	230				
" "	" "	May 2		13.5	9.5	90.8	2.5	230				
" "	" "	" 4		14.5	9.0	87.7	4.2	1,160				
" "	" "	" 8		19.5	8.5	91.8	4.0	91				
" "	" "	" 12		17.0	7.9	81.5	4.8	230				
" "	" "	" 16		17.0	8.4	86.7	5.8	91				
" "	" "	" 19		20.5	7.5	82.6	5.1	2,400				
" "	" "	" 22		21.5	7.4	82.5	3.7	73				
" "	" "	" 24		22.0	6.0	68.0	5.8	460				
Miami River-Trenton, Ohio-Bel. Middletown	M1 50.8	June 2		24.5	6.4	75.7	6.6	230				
" "	" "	" 5		23.0	6.7	77.6	4.0	750				
" "	" "	" 7		25.5	6.2	74.2	6.0	750				
" "	" "	" 13		18.5	6.8	72.4	6.8	4,600				
" "	" "	" 16		24.0	6.5	75.8	4.4	430				
" "	" "	" 19		23.0	6.1	70.3	6.5	2,400				
" "	" "	" 28		25.5	6.2	74.6	3.7	430				
" "	" "	July 5		23.5	6.8	79.0	2.6	2,400				
" "	" "	" 21		23.0	6.4	74.1	3.5	930	7.6			
" "	" "	Aug. 4		24.0	6.1	71.0	2.9	4,600				
" "	" "	" 18		26.5	5.2	63.9	5.5	1,500	7.9			
" "	" "	Sept. 1		24.0	6.1	71.5	5.4	1,500	7.8			
" "	" "	" 15		26.0	4.1	49.9	6.7	430	7.7			
" "	" "	" 29		22.0	5.6	63.4	6.0	430	7.5			
" "	" "	Oct. 13		17.0	4.8	49.7	7.6	930	7.6			
" "	" "	" 27		19.0	3.5	37.9	9.6	390				

TABLE M1-7 MIAMI RIVER BASIN

OHIO RIVER POLLUTION SURVEY
LABORATORY DATA

SUMMARY OF INDIVIDUAL RESULTS

Sampling Point	Mileage From Mouth	Date 1939	Average Discharge c.f.s.	Temp. °C	Dissolved Oxygen p.p.m.	Dissolved Oxygen % Sat.	5 Day B.O.D. p.p.m.	Coliform M.P.N. Per ml	pH	Turbidity p.p.m.	Alkalinity p.p.m.	Hardness p.p.m.
Miami R. Trenton, Ohio Below Middletown	M1 50.8	Nov. 10	495	10.0	7.9	69.5	6.9	930	7.7			
" "	" "	Dec. 7		7.0	9.2	75.3	6.6	1,500				
" "	" "	" 21		5.5	7.4	58.5	5.8	430	7.2		244	
" "	" "	1940 Jan. 8		1.5	10.6	75.8	5.7	1,100	7.3			
" "	" "	" 17		0.0	13.4	91.7	7.5	930	7.5			
" "	" "	Feb. 12		3.5	13.1	98.8	6.4	150	7.5			
" "	" "	" 19		6.0	13.1	105.0	5.2	460	7.8			
" "	" "	" 26		3.5	12.5	94.2	3.1	240	7.6			
" "	" "	Mar. 1		9.0	11.6	99.9	5.4	460				
" "	" "	" 7		6.5	11.7	94.9	3.2	1,100	7.5			
" "	" "	" 13		7.0	10.8	88.3	5.8	1,100	7.5			
" "	" "	" 20		10.5	10.2	91.3	4.9	2,400	7.9			
" "	" "	" 28		10.0	10.7	94.4	6.0	4,600	7.9			
" "	" "	Apr. 5		13.0	8.5	80.0	6.0	430	7.8			
7 Mile Creek Above Eaton, Ohio	M15 67	Aug. 24		21.0	9.6	108.3	0.7	93	8.1			
" "	" "	Sept. 21		17.0	8.6	88.4	1.1	24	7.8			
" "	" "	Oct. 19		11.5	9.4	86.1	1.1	24	7.9			
" "	" "	Nov. 16		6.0	12.0	96.6	0.5	24	7.9			
" "	" "	Dec. 28		1.0	13.5	94.7	0.4	2	7.8			
" "	" "	1940 Jan. 26		0.0	12.9	88.1	0.8	4	7.6			
7 Mile Creek Below Eaton, Ohio	M18 65.5	1939 Aug. 24		22.5	11.0	125.1	1.7	150	7.5			
" "	" "	Sept. 21		18.5	9.4	99.9	1.7	93	8.1			
" "	" "	Oct. 19		10.5	10.4	92.9	0.9	93	7.9			
" "	" "	Nov. 16		4.5	14.4	110.9	0.3	43	8.2			
" "	" "	Dec. 28		1.0	10.5	74.0	5.0	2,400	7.9			
" "	" "	1940 Jan. 26		0.0	10.3	70.5	5.5	1,100	7.6			
Four Mile Creek Above Oxford, Ohio	M17 55.5	1939 Aug. 24		20.0	8.2	89.6	0.8	7	8.1			
" "	" "	Sept. 21		15.5	5.8	57.3	1.0	110	7.5			
" "	" "	Oct. 19		11.0	6.7	60.5	1.0	2	7.5			
" "	" "	Nov. 16		3.0	10.6	78.3	1.3	24	7.7			
" "	" "	Dec. 28		0.0	12.3	84.4	0.9	30	7.7			
" "	" "	1940 Jan. 26		0.0	12.6	86.2	5.3	4	7.6			
Four Mile Creek Below Oxford, Ohio	M17 54	1939 Aug. 24		20.5	8.0	88.1	1.2	240	8.0			
" "	" "	Sept. 21		18.5	8.7	91.9	3.4	23	8.2			
" "	" "	Oct. 19		10.0	9.5	83.9	2.0	15	7.9			
" "	" "	Nov. 16		2.5	10.5	76.6	2.0	110	7.7			
" "	" "	Dec. 28		0.0	12.3	84.2	1.0	9	7.9			
" "	" "	1940 Jan. 26		0.0	10.7	73.1	2.8	1,100	7.6			
Seven Mile Creek At Mouth	M18 39	1939 Sept. 29		19.5	7.9	85.0	0.6	4	7.7			
" "	" "	Oct. 13		13.0	8.5	80.5	0.5	24	7.8			
" "	" "	" 27		19.0	8.1	86.6	4.9	240	7.9			
" "	" "	Nov. 10		9.5	10.6	92.8	0.9	4	7.8			

TABLE Mi-7 MIAMI RIVER BASIN

OHIO RIVER POLLUTION SURVEY
LABORATORY DATA

SUMMARY OF INDIVIDUAL RESULTS

Sampling Point	Mileage From Mouth		Date 1939	Average Discharge c.f.s.	Temp. °C	Dissolved Oxygen p.p.m.	Dissolved Oxygen % Sat.	5 Day B.O.D. p.p.m.	Coliform M.P.N. Per ml	pH	Turbidity p.p.m.	Alkalinity p.p.m.	Hardness p.p.m.
Seven Mile Creek At Mouth	Mi5	39	Dec. 7		5.0	11.3	88.5	0.6	4				
" "	"	"	" 21		3.5	11.8	88.4	0.8	1	7.6			
" "	"	"	1940 Jan. 8		1.5	11.9	85.0	0.4	**	7.7			
" "	"	"	" 26		0.0	13.0	88.9	2.4	11	7.7			
Miami River - Bridge at New Miami Above Hamilton, Ohio	Mi	38.3	1939 Feb. 21		5.5	11.4	90.1	6.0	460				
" "	"	"	" 27		3.0	12.8	94.7	3.3	240				
" "	"	"	Mar. 3		3.5	13.0	97.7	3.7	240				
" "	"	"	" 7		7.0	12.0	98.6	4.4	240				
" "	"	"	" 10		7.0	11.2	92.2	4.1	460				
" "	"	"	" 13		7.0	11.6	95.1	5.1	460				
" "	"	"	" 15		8.0	11.2	94.6	3.2	1,100				
" "	"	"	" 20		6.0	12.2	97.4	2.2	150				
" "	"	"	" 23		9.0	10.7	92.2	4.5	1,100				
" "	"	"	" 27		11.0	9.6	86.7	3.0	36				
" "	"	"	" 31		7.5	11.2	92.8	4.4	240				
" "	"	"	Apr. 4		9.5	10.6	92.6	3.7	460				
" "	"	"	" 7		7.0	11.2	92.3	4.7	240				
" "	"	"	" 10		10.5	11.2	99.9	2.2	150				
" "	"	"	" 12		9.0	10.4	90.1	5.1	1,100				
" "	"	"	" 17		11.5	10.5	95.7	3.8	150				
" "	"	"	" 20		9.5	11.1	96.8	0.5	460				
" "	"	"	" 26		16.5	8.9	90.3	3.2	460				
" "	"	"	" 28		17.0	8.7	88.9	3.0	930				
" "	"	"	May 1		14.5	9.6	93.6	2.6	230				
" "	"	"	" 4		15.0	9.1	89.5	4.0	2,400				
" "	"	"	" 8		19.5	9.1	97.9	4.3	36				
" "	"	"	" 12		17.0	7.3	75.4	4.5	430				
" "	"	"	" 16		17.0	8.7	89.0	5.0	73				
" "	"	"	" 19		21.5	7.6	85.0	5.2	43				
" "	"	"	" 22		24.5	6.4	76.3	4.7	43				
" "	"	"	" 24		23.5	5.4	62.4	4.8	43				
" "	"	"	June 2		26.0	4.9	59.7	5.0	460				
" "	"	"	" 5		23.5	6.5	76.0	4.3	93				
" "	"	"	" 7		27.0	6.4	79.8	5.1	23				
" "	"	"	" 13		19.0	7.2	76.5	4.1	1,100				
" "	"	"	" 16		24.5	6.0	70.7	2.7	150				
Miami River Black St. Hwy. Bridge Hamilton, Ohio	Mi	35.9	Feb. 27		4.5	13.3	102.5	3.3	240				
" "	"		Mar. 3		4.0	12.8	97.6	3.6	460				
" "	"	"	" 7		6.0	12.4	99.4	4.4	240				
" "	"	"	" 10		9.0	10.8	93.2	Broken	460				
" "	"	"	" 13		7.0	11.6	95.5	5.1	240				
" "	"	"	" 15		8.5	11.0	93.8	5.9	240				
" "	"	"	" 20		8.5	11.5	97.7	15.5	2,400				
" "	"	"	" 23		11.5	10.1	92.2	24.7	930				
" "	"	"	June 19		23.0	5.1	58.8	7.2	2,400				
" "	"	"	" 26			6.0	72.0	4.2	930				

TABLE Mi-7 MIAMI RIVER BASIN

OHIO RIVER POLLUTION SURVEY
LABORATORY DATA

SUMMARY OF INDIVIDUAL RESULTS

Sampling Point	Mileage From Mouth	Date 1939	Average Discharge c.f.s.	Temp. °C	Dissolved Oxygen p.p.m.	Dissolved Oxygen % Sat.	5 Day B.O.D. p.p.m.	Coliforms M.P.N. Per ml	pH	Turbidity p.p.m.	Alkalinity p.p.m.	Hardness p.p.m.
Miami River Black St. Hiwy Bridge Hamilton, Ohio	Mi 35.9	July 5		23.5	6.4	75.0	4.0	2,400				
" "	" "	" 21		23.0	6.6	76.0	3.0	230	7.6			
" "	" "	Aug. 4		23.5	5.9	68.6	2.3	430				
" "	" "	" 18		27.0	5.4	66.3	4.3	73	7.7			
" "	" "	Sept. 1		24.0	6.4	75.4	3.6	150	7.7			
" "	" "	" 15		26.5	4.8	58.7	3.7	46	7.6			
" "	" "	" 29		22.0	8.0	90.9	6.4	240	7.9			
" "	" "	Oct. 13		17.5	5.3	55.3	5.1	93	7.6			
" "	" "	" 27		19.0	3.9	41.9	5.0	230	7.6			
" "	" "	Nov. 10	680	10.0	6.9	60.8	4.6	460	7.5			
" "	" "	Dec. 7	739	7.0	8.0	66.1	3.5	1,500				
" "	" "	" 21	616	5.0	8.4	65.6	4.2	430	7.6		260	
" "	" "	1940 Jan. 8	435	1.0	7.0	49.3	3.6	39	6.9			
" "	" "	" 23	1,030	0.0	12.3	84.4	4.9	150				
" "	" "	Feb. 2	710	1.0	10.3	72.4	13.9	1,100	7.9			
Miami River Bridge near Venice Below Hamilton, Ohio	Mi 30.4	July 21		24.5	7.0	82.2	3.0	430	7.6			
" "	" "	Aug. 4		23.5	5.8	67.8	3.0	1,500				
" "	" "	" 18		27.5	6.4	79.8	6.8	430	7.6			
" "	" "	Sept. 1		24.0	6.5	76.7	6.1	2,300	7.9			
" "	" "	" 15		25.0	1.9	[illegible]	4.1	11,000	7.8			
" "	" "	" 29		21.5	3.5	38.9	11.7	2,400	7.5			
" "	" "	Oct. 13		16.0	3.2	31.9	7.8	4,600	7.5			
" "	" "	" 27		19.5	5.0	54.4	1.5	720	7.5			
" "	" "	Nov. 10	670	9.0	6.8	59.1	9.7	930	7.5			
" "	" "	Dec. 7	739	6.0	7.6	60.5	6.7	390				
" "	" "	" 21	616	5.0	7.0	54.5	11.8	230	7.5			
" "	" "	1940 Jan. 8	990	0.0	10.2	69.6	10.9	930	7.5			
" "	" "	" 17	4,250	0.0	13.4	91.6	11.1	430	7.5			
" "	" "	" 23	756	0.0	12.1	83.0	9.4	430				
" "	" "	Feb. 12	7,890	1.5	13.3	95.0	7.0	2,400	7.5			
" "	" "	" 19	9,050	3.5	13.0	97.9	7.5	93	7.8			
" "	" "	Feb. 26	1,980	3.5	12.5	94.1	7.8	240	7.7			
" "	" "	Mar. 1	3,090	7.5	12.1	100.5	6.2	460				
" "	" "	" 7	7,250	4.0	12.6	95.6	5.2	2,400	7.6			
" "	" "	" 13	2,680	6.5	11.0	89.4	7.7	1,100	7.7			
" "	" "	" 20	2,180	10.0	9.4	83.0	7.3	930	8.0			
" "	" "	" 28	1,450	7.0	10.0	82.3	9.2	2,400	7.8			
" "	" "	Apr. 5	2,040	14.5	8.1	79.0	5.4	73	7.8			
Miami River Near Venice Below Hamilton, Ohio	Mi 24.8	1939 Feb. 21		5.5	11.4	89.9	5.5	1,100				
" "	" "	" 27		3.5	12.6	94.9	3.2	240				
" "	" "	Mar. 3		4.5	12.8	98.4	4.0	240				
" "	" "	" 7		6.5	11.9	96.5	4.0	1,100				
" "	" "	" 10		8.5	10.8	92.5	4.2	460				
" "	" "	" 13		7.5	11.8	98.0	4.6	240				
" "	" "	" 15		8.5	11.1	95.0	3.6	460	8.0	520	124	
" "	" "	" 20		7.0	11.9	97.9	3.1	240	8.0	130	221	

TABLE Mi-7 MIAMI RIVER BASIN

OHIO RIVER POLLUTION SURVEY
LABORATORY DATA

SUMMARY OF INDIVIDUAL RESULTS

Sampling Point	Mileage From Mouth	Date 1939	Average Discharge c.f.s.	Temp. °C	Dissolved Oxygen		5 Day B.O.D. p.p.m.	Coliforms M.P.N. Per ml	pH	Turbidity p.p.m.	Alkalinity p.p.m.	Hardness p.p.m.
					p.p.m.	% Sat.						
Miami River Near Venice Below Hamilton, Ohio	Mi 24.8	Mar. 23		10.5	10.1	90.5	4.8	460	8.1	58	238	
" "	" "	" 27		11.0	9.4	84.7	3.6	460	8.0	40	248	
" "	" "	" 31		--	11.2	--	4.3	430	8.1	140	208	
" "	" "	April 4		9.5	10.3	89.9	3.2	230				
" "	" "	" 7		7.0	11.4	93.3	4.1	460	8.1	190	194	
" "	" "	" 10		10.5	11.0	98.2	2.2	93				
" "	" "	" 12		9.0	10.6	91.1	4.7	210	8.0	70	226	
" "	" "	" 17		10.5	10.5	93.4	4.0	460	7.5	650	107	
" "	" "	" 20		9.5	11.0	96.2	3.0	460	7.2	180	162	
" "	" "	" 26		16.5	8.7	88.4	3.2	930				
" "	" "	" 28		17.0	8.4	86.1	3.6	150	7.5	40	238	
" "	" "	May 1		14.0	9.5	91.6	2.6	91	8.0	38	256	
" "	" "	" 4		15.0	9.1	89.7	3.5	430				
" "	" "	" 8		19.5	9.8	106.0	4.5	36				
" "	" "	" 12		17.5	9.3	96.8	4.4	430	8.1	10	244	
" "	" "	" 16		17.0	9.3	95.2	6.3	230				
" "	" "	May 19		21.0	9.6	106.8	5.4	91	8.1	15	249	
" "	" "	" 22		22.0	7.9	89.5	4.9	240				
" "	" "	" 24		23.0	8.7	100.1	5.8	150		20	250	
" "	" "	June 2		25.0	7.6	91.1	5.2	460	8.0	22	240	
" "	" "	" 5		23.0	7.9	90.8	5.1	230				
" "	" "	" 7		26.5	8.2	100.7	5.1	150	8.3	40	244	
" "	" "	" 13		19.0	6.8	72.6	5.3	460				
" "	" "	" 16		24.5	6.1	71.7	3.3	240	7.9	38	218	
" "	" "	" 19		23.5	4.7	54.4	5.9	2,400				
" "	" "	" 28		26.0	6.6	80.4	4.2	930				
" "	" "	July 5		23.5	6.7	78.1	3.8	1,500				
W. Fk. Whitewater River Above Hagerstown, Ind.	MiW 80	July 12		21.0	11.4	126.8	2.0	23				
" "	" "	Aug. 8		18.5	8.8	92.7	0.7	46				
" "	" "	Oct. 10		17.0	8.2	84.6	0.7	5	7.9			
" "	" "	Nov. 7		7.5	10.6	88.2	0.6	8	7.8			
" "	" "	Dec. 18		6.0	11.7	93.8	0.6	43	7.8			
Nettle Creek above Hagerstown, Ind.	MiWN 80	July 12		22.5	11.1	126.9	1.1	7				
" "	" "	Aug. 8		21.0	9.0	99.6	0.7	9				
" "	" "	Oct. 10		19.0	9.0	96.6	1.1	24	8.0			
" "	" "	Nov. 7		7.0	11.0	90.6	0.6	43	7.8			
" "	" "	Dec. 18		6.0	11.5	92.0	0.6	4	7.9			
W. Fk. Whitewater R. Below Hagerstown, Ind.	MiWw 79	July 12		20.5	8.8	96.4	0.8	29				
" "	" "	Aug. 8		21.0	7.8	86.8	0.7	24				
" "	" "	Oct. 10		18.5	7.2	76.0	0.4	110	7.9			
" "	" "	Nov. 7		9.0	8.9	77.0	1.5	43	7.6			
" "	" "	Dec. 18		7.5	11.2	93.4	0.6	23	7.8			
W.Fk.Whitewater River Abv.Cambridge City,Ind.	MiWw 73	July 12	81	22.0	10.3	117.1	0.9	93				
" "	" "	Aug. 8	72	22.5	10.1	115.2	0.8	15				

TABLE Mi-7 MIAMI RIVER BASIN

OHIO RIVER POLLUTION SURVEY
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SUMMARY OF INDIVIDUAL RESULTS

Sampling Point	Mileage From Mouth	Date 1939	Average Discharge c.f.s.	Temp. °C	Dissolved Oxygen p.p.m.	Dissolved Oxygen % Sat.	5 Day B.O.D. p.p.m.	Coliform M.P.N. Per ml	pH	Turbidity p.p.m.	Alkalinity p.p.m.	Hardness p.p.m.
W. Fk. Whitewater River Abv. Cambridge City, Ind.	MiWw 73	Oct. 10	34	20.0	9.7	105.6	1.1	110	8.0			
" "	" "	Nov. 7	45	6.5	11.5	93.2	0.9	75	7.9			
" "	" "	Dec. 18		5.5	12.0	94.9	0.5	43	8.0			
W. Fk. Whitewater River Below Cambridge City	MiWw 72	July 12	81	22.5	11.5	131.5	0.9	93				
" "	" "	Aug. 8	72	22.0	9.0	101.6	0.9	46				
" "	" "	Oct. 10	34	20.0	8.3	90.5	1.4	46	8.0			
" "	" "	Nov. 7	45	7.0	11.1	91.0	0.5	43	8.0			
" "	" "	Dec. 18		6.0	11.5	92.4	0.4	43	8.0			
W. Fk. Whitewater River Above Connersville, Ind.	MiWw 62	July 13		23.5	8.4	98.3	0.8	8				
" "	" "	" 25		22.5	9.6	109.9	0.6	21				
" "	" "	Aug. 9		21.5	8.4	94.8	1.7	43				
" "	" "	" 22		18.0	8.6	90.0	1.5	43	8.0			
" "	" "	Sept. 19	69	16.5	8.2	83.8	1.2	5	7.9			
" "	" "	Oct. 17	64	10.5	9.6	85.4	0.7	11	7.9			
" "	" "	Nov. 14	85	6.0	10.7	85.7	0.4	1	7.8			
" "	" "	Dec. 26		2.0	11.6	83.5	1.3	4	7.6	5		
" "	" "	1940 Jan. 19		0.0	12.4	84.8	1.0	24	7.7			
" "	" "	" 30		0.0	12.5	85.2	0.4	24				
" "	" "	Feb. 7		0.0	12.0	82.4	6.2	43	7.8			
" "	" "	" 15		2.0	13.4	97.0	1.6	93	7.7			
" "	" "	" 21		3.0	11.9	88.6	2.8	160	7.7			
" "	" "	" 28		4.0	12.1	92.5	3.7	24	7.5			
" "	" "	Mar. 5		4.0	12.0	91.8	1.4	46	7.7			
" "	" "	" 11		4.5	11.9	91.8	0.5	4	8.0			
" "	" "	" 15		2.5	12.1	88.6	0.5	9	8.1			
" "	" "	" 22		4.0	12.4	94.1	0.6	2				
" "	" "	Apr. 1		12.0	11.4	105.3	1.3	[illegible]	7.9			
W. Fk. Whitewater River Below Connersville, Ind.	MiWw 61	1939 July 13		24.0	7.9	92.5	2.5	460				
" "	" "	" 25		23.5	7.8	91.0	2.8	240				
" "	" "	Aug. 9		24.0	7.0	81.5	1.6	430				
" "	" "	" 22		19.5	7.5	80.8	1.4	230	8.0			
" "	" "	Sept. 19	69	19.0	7.2	77.3	2.0	460	8.0			
" "	" "	Oct. 17	64	11.0	8.5	76.5	1.4	430	7.9			
" "	" "	Nov. 14	85	6.0	11.0	88.1	1.0	240	7.8			
" "	" "	Dec. 26		2.0	14.0	101.2	3.0	930	7.8	7		
" "	" "	1940 Jan. 19		0.0	13.3	90.8	1.9	240	7.8			
" "	" "	" 30		0.0	13.2	90.1	1.1	240				
" "	" "	Feb. 7		0.0	12.1	83.0	6.4	460	7.8			
" "	" "	" 15		2.0	13.3	96.0	3.3	240	7.8			
" "	" "	" 21		2.5	11.8	86.7	3.8	93	7.8			
" "	" "	" 28		3.5	12.3	92.3	3.5	110	7.8			
" "	" "	Mar. 5		4.5	10.7	82.5	2.0	460	7.6			
" "	" "	" 11		5.5	11.7	92.8	1.1	46	8.0			
" "	" "	" 15		3.5	11.8	88.9	1.4	110	7.9			
" "	" "	" 22		4.0	12.3	93.5	1.1	110				

TABLE Mi-7 MIAMI RIVER BASIN

OHIO RIVER POLLUTION SURVEY
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SUMMARY OF INDIVIDUAL RESULTS

Sampling Point	Mileage From Mouth		Date 1940	Average Discharge c.f.s.	Temp. °C	Dissolved Oxygen p.p.m.	Dissolved Oxygen % Sat.	5 Day B.O.D. p.p.m.	Coliform M.P.N. Per ml	pH	Turbidity p.p.m.	Alkalinity p.p.m.	Hardness p.p.m.
W. Fk. Whitewater River Below Connersville, Ind	Mi.W.	61	Apr. 1		13.0	10.6	100.3	3.1	460	8.0			
W. Fk. Whitewater River Above Brookville, Ind.	Mi.W.	33	1939 July 13		24.5	9.3	110.1	0.9	9				
" "	"	"	" 25		22.5	8.4	96.6	1.0	9				
" "	"	"	Aug. 9		23.0	7.8	89.3	1.1	9				
" "	"	"	" 22		20.0	7.8	85.0	1.2	43	8.1			
" "	"	"	Sept. 19		17.5	8.2	85.6	0.9	4	8.1			
" "	"	"	Oct. 17		10.0	9.9	87.7	0.6	4	7.9			
" "	"	"	Nov. 14		5.0	11.8	92.0	0.4	4	8.0			
" "	"	"	Dec. 26		3.5	13.6	102.1	2.0	2	7.9	8		
" "	"	"	1940 Jan. 19		0.0	Lost	—	1.7	240	7.8			
" "	"	"	" 30		0.0	12.7	86.7	1.1	4				
" "	"	"	Feb. 7		0.0	13.3	90.7	8.6	460	7.5			
" "	"	"	" 15		1.0	12.7	89.4	2.3	460	7.8			
" "	"	"	" 21		5.0	12.7	99.1	3.4	150	7.7			
" "	"	"	" 28		4.0	12.6	95.8	2.8	460	7.9			
" "	"	"	Mar. 5		7.0	12.0	98.9	1.8	240	7.8			
" "	"	"	" 11		7.0	11.7	96.3	0.6	4	8.0			
" "	"	"	" 15		6.0	12.3	98.9	0.8	9	8.0			
" "	"	"	" 25		4.5	12.7	97.8	0.9	24	8.1			
" "	"	"	Apr. 2		12.0	10.6	98.1	1.3	4	7.8			
E. Fk. Whitewater River Above Richmond, Ind.	Mi.W.	66	1939 July 12	89	23.5	7.8	90.5	1.3	93				
" "	"	"	Aug. 8	79	24.0	6.4	74.4	1.7	240				
" "	"	"	Oct. 10	37	23.0	5.0	57.1	1.6	240	7.9			
" "	"	"	Nov. 7	49	10.0	8.2	72.2	1.5	230	7.9			
" "	"	"	Dec. 18		7.0	9.9	81.3	1.1	750	8.0			
" "	"	"	1940 Feb. 21		3.5	12.8	96.5	2.1	93	7.9			
" "	"	"	" 28		4.0	12.4	94.7	4.3	240	7.8			
" "	"	"	Mar. 5		4.5	12.4	96.0	1.9	24	7.8			
" "	"	"	" 11		2.5	12.6	92.2	0.9	24	8.0			
" "	"	"	" 15		2.0	12.8	92.5	1.5	46	8.0			
" "	"	"	Mar. 22		5.0	13.5	105.2	1.1	240				
" "	"	"	Apr. 1		12.0	10.8	99.4	1.6	24	8.2			
E. Fk. Whitewater River Below Richmond, Ind.	Mi.W.	65	1939 July 12	89	22.0	8.0	90.3	2.8	150				
" "	"	"	Aug. 8	79	23.0	6.4	73.4	2.5	240				
" "	"	"	Oct. 10	37	22.0	5.6	94.0	2.1	240	7.9			
" "	"	"	Nov. 7	49	10.0	10.0	88.4	2.4	230	7.9			
" "	"	"	Dec. 13		6.5	10.5	85.2	1.4	430	7.8			
" "	"	"	1940 Jan. 19		0.0	13.8	94.5	3.1	93	7.8			
" "	"	"	" 30		5.0	11.8	92.2	2.8	240				
" "	"	"	Feb. 7		2.0	11.6	84.0	8.0	290	7.8			
" "	"	"	" 15		3.0	13.5	100.4	2.5	43	7.8			
" "	"	"	" 21		5.0	12.5	97.8	5.6	1,100	8.0			
" "	"	"	" 28		4.5	12.4	95.8	4.5	93	7.8			
" "	"	"	Mar. 5		4.0	12.4	94.3	2.5	24	7.7			
" "	"	"	" 11		2.5	12.5	91.7	2.0	9	8.0			

TABLE Mi-7 MIAMI RIVER BASIN

OHIO RIVER POLLUTION SURVEY
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SUMMARY OF INDIVIDUAL RESULTS

Sampling Point	Mileage From Mouth	Date 1940	Average Discharge c.f.s.	Temp. °C	Dissolved Oxygen		5 Day B.O.D. p.p.m.	Coliforms M.P.N. Per ml	pH	Turbidity p.p.m.	Alkalinity p.p.m.	Hardness p.p.m.
					p.p.m.	% Sat.						
E. Fk. Whitewater River Below Richmond, Ind.	Mi We 65	Mar. 15		3.5	12.6	94.9	4.4	46	7.9			
" "	" "	" 22		6.0	15.5	124.0	2.0	46				
" "	" "	Apr. 1		12.5	12.6	117.3	3.7	110	8.2			
E. Fk. Whitewater River Above Brookville, Ind.	Mi We 33	1939 July 13		23.5	9.1	105.6	1.0	24				
" "	" "	" 25		22.5	9.3	106.3	1.3	9				
" "	" "	Aug. 9		22.5	8.2	94.1	1.1	75				
" "	" "	" 22		20.0	8.1	87.9	1.4	93	8.1			
" "	" "	Sept. 19		18.5	8.0	85.1	1.1	24	8.1			
" "	" "	Oct. 17		10.0	10.4	91.8	1.3	2	7.9			
" "	" "	Nov. 14		4.0	12.6	96.3	0.8	9	8.2			
" "	" "	Dec. 26		1.5	14.7	104.8	2.4	**	8.2	5		
" "	" "	1940 Jan. 19		0.0	Lost	--	2.1	24	7.7			
" "	" "	" 30		0.0	12.7	86.9	1.7	8				
" "	" "	Feb. 7		0.5	13.2	91.6	8.3	150	7.5			
" "	" "	" 15		1.0	12.8	90.0	1.8	93	7.9			
" "	" "	Feb. 21		4.0	12.8	97.8	2.0	93	7.8			
" "	" "	" 28		4.5	12.6	97.0	2.9	240	7.9			
" "	" "	Mar. 5		5.5	12.2	96.4	1.7	240	7.8			
" "	" "	" 11		7.0	12.2	100.2	0.7	9	8.0			
" "	" "	" 15		7.0	12.7	104.6	0.7	24	8.0			
" "	" "	" 25		4.0	12.8	97.7	1.2	**	8.1			
" "	" "	Apr. 2		12.0	11.3	104.4	2.0	1	8.0			
Whitewater River Below Brookville, Ind.	MiW 31	1939 July 13	505	23.5	7.8	91.3	1.1	93				
" "	" "	" 25	433	23.0	8.1	93.3	0.9	46				
" "	" "	Aug. 9	333	23.5	7.5	87.1	1.1	93				
" "	" "	" 22	461	20.5	7.6	93.7	1.2	460	8.1			
" "	" "	Sept. 19	140	18.0	8.2	85.7	0.9	240	8.1			
" "	" "	Oct. 17	133	10.5	9.7	86.4	0.5	23	7.9			
" "	" "	Nov. 14	160	5.5	11.7	92.8	0.6	24	7.9	15		
" "	" "	Dec. 26	156	2.0	13.3	96.1	2.0	93	8.0	7		
" "	" "	Jan. 19	297	0.0	Lost	—	3.8	93	7.8			
" "	" "	" 30	220	1.0	12.6	88.3	1.1	4				
" "	" "	Feb. 7	1,230	1.0	13.1	92.1	8.3	93	7.5			
" "	" "	" 15	830	1.5	13.0	92.9	2.0	93	7.7			
" "	" "	" 21	1,380	5.0	12.6	98.8	3.0	460	7.7			
" "	" "	" 28	1,460	7.0	12.5	102.5	2.5	1,100	7.9			
" "	" "	Mar. 5	2,290	8.0	12.0	101.3	1.6	110	7.7			
" "	" "	" 11	[illegible]	10.0	11.7	103.5	0.6	24	8.0			
" "	" "	Mar. 15	649	4.5	12.5	96.1	1.2	21	8.0			
" "	" "	" 25	385	5.5	12.6	99.9	0.8	9	8.1			
" "	" "	Apr. 2	359	13.0	10.2	95.9	1.5	24	8.0			
Whitewater River Above Harrison, Ind.	Mi W 14	1939 July 13		24.0	7.8	91.1	0.9	15				
" "	" "	" 25		22.5	8.2	93.4	1.3	9				
" "	" "	Aug. 9		23.5	7.8	91.3	1.4	7				
" "	" "	" 22		21.5	7.4	82.5	1.6	93	8.0			

TABLE MI-7 MIAMI RIVER BASIN

OHIO RIVER POLLUTION SURVEY
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SUMMARY OF INDIVIDUAL RESULTS

Sampling Point	Mileage From Mouth	Date 1939	Average Discharge c.f.s.	Temp. °C	Dissolved Oxygen		5 Day B.O.D. p.p.m.	Coliforms M.P.N. Per ml	pH	Turbidity p.p.m.	Alkalinity p.p.m.	Hardness p.p.m.
					p.p.m.	% Sat.						
Whitewater River Above Harrison, Ind.	MiW 14	Sept. 19		19.5	7.6	81.9	1.1	11	8.0			
" "	" "	Oct. 17		11.5	9.6	88.0	0.4	5	7.9			
" "	" "	Nov. 14		5.0	12.4	97.1	0.5	4	8.1	8		
" "	" "	Dec. 26		3.0	14.1	104.6	1.4	1	8.1	3		
Whitewater River-below Harrison, Indiana	MiW 13	Feb. 21	2,910	6.5	11.6	94.4	2.8	23				
" "	" "	" 27	1,470	4.5	12.9	99.5	1.8	93				
" "	" "	Mar. 3		5.5	12.2	96.7	1.1	23				
" "	" "	" 7		7.0	12.0	98.9	1.6	39				
" "	" "	" 10		8.0	11.3	95.5	0.6	23				
" "	" "	" 13		7.5	11.2	93.0	3.5	93				
" "	" "	" 15		10.0	10.4	91.4	1.2	39				
" "	" "	" 20		8.5	11.7	100.1	0.8	9				
" "	" "	" 23		11.0	11.0	99.4	0.9	4				
" "	" "	" 27		11.0	9.2	83.1	1.3	8				
" "	" "	" 31		—	11.6	—	1.1	240				
" "	" "	Apr. 4		10.0	11.2	99.3	0.6	4				
" "	" "	" 7		7.0	11.5	94.8	1.9	24				
" "	" "	" 10		11.5	11.1	101.0	0.6	9				
" "	" "	" 12		8.0	11.2	94.4	0.8					
" "	" "	" 17		12.0	10.2	94.2	2.5	43				
" "	" "	" 20		9.5	10.8	94.2	1.2	93				
" "	" "	" 26		16.5	9.2	93.5	0.7	23				
" "	" "	" 28		16.0	8.9	89.6	1.4	43				
" "	" "	May 1		14.5	9.8	95.2	0.9	230				
" "	" "	" 4		14.5	10.1	98.3	0.8	23				
" "	" "	" 8		19.0	9.4	100.7	1.2	4				
" "	" "	" 12		17.0	9.5	97.7	1.1	2				
" "	" "	" 16		16.5	9.3	94.4	1.0	9				
" "	" "	" 19		20.0	9.0	97.8	1.3	4				
" "	" "	" 22		21.5	8.7	98.0	1.7	7				
" "	" "	" 24		22.5	8.3	95.2	1.6	24				
" "	" "	June 2		24.5	9.1	107.9	2.0	4				
" "	" "	" 5		22.0	8.5	96.3	1.9	46				
" "	" "	" 7		25.5	8.6	103.9	1.6	24				
" "	" "	" 13		19.0	8.2	87.6	3.0	240				
" "	" "	" 16		25.0	7.7	92.4	1.6	150				
" "	" "	" 19		23.0	7.3	84.4	4.5	1,100				
" "	" "	" 28		26.5	6.4	78.3	4.1	110				
" "	" "	July 5		24.5	7.2	85.6	3.2	2,400				
" "	" "	" 13		23.5	8.0	93.0	1.3	9				
" "	" "	" 25		23.0	8.2	94.8	1.8	24				
" "	" "	Aug. 9		24.0	8.1	94.6	1.7	9				
" "	" "	" 22		22.0	7.4	83.2	1.8	240	8.0			
" "	" "	Sept. 19	190	19.5	7.7	83.4	1.4	9	8.0			
" "	" "	Oct. 17	170	12.0	9.6	89.0	0.6	1	7.9			
" "	" "	Nov. 14	210	6.0	12.3	98.3	0.4	4	8.0	7		
" "	" "	Dec. 26		2.0	14.1	101.9	1.8	2		5		

TABLE Mi-7 MIAMI RIVER BASIN

OHIO RIVER POLLUTION SURVEY
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SUMMARY OF INDIVIDUAL RESULTS

Sampling Point	Mileage From Mouth	Date 1940	Average Discharge c.f.s.	Temp. °C	Dissolved Oxygen p.p.m.	Dissolved Oxygen % Sat.	5 Day B.O.D. p.p.m.	Coliforms M.P.N. Per ml	pH	Turbidity p.p.m.	Alkalinity p.p.m.	Hardness p.p.m.
Whitewater River-below Harrison, Indiana	MiW 13	Jan. 19		0.0	Lost	—	1.9	93	7.8			
" "	" "	Feb. 21		4.5	12.7	98.2	2.8	240	7.8			
" "	" "	" 28		7.0	12.2	100.2	0.9	46	7.8			
" "	" "	Mar. 5		8.5	12.0	102.3	1.6	240	7.8			
" "	" "	" 11		7.0	11.7	96.3	0.7	15	8.0			
" "	" "	" 15		7.0	12.3	101.2	0.9	24	8.0			
" "	" "	" 25		4.0	11.8	89.6	1.0	1	8.2			
" "	" "	Apr. 2		14.0	10.1	97.4	1.1	2	7.9			
Miami River Cleves Bridge	Mi 4.2	1939 Mar. 3	16,860	4.0	12.3	93.7	1.9	240				
" "	" "	" 7	11,710	4.5	12.0	92.5	7.0	120				
" "	" "	" 13	35,100	7.0	11.1	91.4	3.9	460				
" "	" "	" 21	5,600	8.0	11.2	94.2	4.7	240	8.2	85	244	
" "	" "	Apr. 4	—	10.5	10.9	97.1	1.4	43	8.2	25	244	
" "	" "	" 10	6,400	9.0	9.9	85.1	3.2	23	8.1	28	236	
" "	" "	" 26	8,450	17.0	8.4	86.6	4.0	460	7.8	67	236	
" "	" "	May 4	4,480	15.0	9.8	96.2	1.9	9	8.0	18	252	
" "	" "	" 8	3,690	20.0	9.9	108.3	7.1	11	8.0	20	251	
" "	" "	" 16	3,040	19.0	9.5	101.9	4.8	460	8.3	10	238	
" "	" "	" 22	3,060	23.0	8.2	94.2	4.0	43	8.0	40	238	
" "	" "	June 5	2,150	23.5	8.5	98.6	8.7	150	8.0	70	243	
" "	" "	" 13	—	25.0	7.6	90.7	3.6	240	8.3	150	216	
" "	" "	" 19	21,700	25.0	6.8	80.9	4.8	1,100	7.9	470	126	
" "	" "	" 27	3,750	25.5	7.2	86.3	2.3	93	8.0	100	225	
" "	" "	" 28	—	25.5	7.4	89.8	1.2	43	7.6	64	255	
" "	" "	July 5	7,030	27.0	6.4	79.3	4.0	2,400	8.0	3,100		
" "	" "	" 11	3,210	25.0	6.7	79.6	3.7	930	7.7	310	193	
" "	" "	" 17	1,730	24.0	10.0	117.2	4.6	230	7.9	57	228	
" "	" "	" 19	7,300	23.5	6.7	78.3	4.4	1,500	7.7	525	163	
" "	" "	" 25	1,660	25.5	8.5	102.8	3.5	430	8.0	53	239	
" "	" "	" 31	14,990	23.5	5.4	62.8	4.4	4,600	7.6	800	151	
" "	" "	Aug. 2	5,200	25.0	6.8	80.7	2.8	230	7.8	200	154	
" "	" "	Aug. 8	2,120	25.0	7.8	93.4	3.2	230	8.0	70	230	
" "	" "	" 14	2,350	26.0	7.1	85.9	5.4	930	8.3	240	199	
" "	" "	" 16	1,700	27.0	7.5	93.4	4.0	230	8.1	60	212	
" "	" "	" 22	2,300	24.0	7.4	86.2	3.7	930	8.1	87	216	
" "	" "	" 28	1,340	23.0	9.6	110.4	3.8	36	8.0	25	226	
" "	" "	" 30	1,300	23.5	10.2	119.2	5.0	46	8.1	31	222	
" "	" "	Sept. 5	1,020	23.0	8.1	93.2	5.3	93	8.1	27	225	
" "	" "	" 11	920	21.5	8.4	94.3	3.6	23	8.1	38	222	
" "	" "	" 13	950	23.5	8.0	93.0	3.3	43	7.9	18	213	
" "	" "	" 19	880	21.5	8.0	89.8	2.4	43	7.9	42	236	
" "	" "	" 25	810	21.0	8.5	94.3	3.4	21	7.9	25	232	
" "	" "	" 27	830	20.0	8.8	95.7	5.9	24	7.9	18	234	
" "	" "	Oct. 3	830	15.0	9.4	92.4	3.7	75	7.9	10	228	
" "	" "	" 9	830	22.5	7.8	89.0	4.8	46	7.9	20	232	
" "	" "	" 11	700	19.5	7.5	80.8	4.5	23	7.9	13	227	
" "	" "	" 17	710	12.5	9.2	85.5	2.6	46	7.9	8	245	

TABLE M1-7 MIAMI RIVER BASIN

OHIO RIVER POLLUTION SURVEY
LABORATORY DATA

SUMMARY OF INDIVIDUAL RESULTS

Sampling Point	Mileage From Mouth	Date 1939	Average Discharge c.f.s.	Temp. °C	Dissolved Oxygen p.p.m.	Dissolved Oxygen % Sat.	5 Day B.O.D. p.p.m.	Coliforms M.P.N. Per ml	pH	Turbidity p.p.m.	Alkalinity p.p.m.	Hardness p.p.m.
Miami River Cleves Bridge	M1 4.2	Oct. 23	720	13.5	9.9	94.5	5.2	43	8.0	12	248	
" "	" "	" 25	830	16.0	8.2	82.1	5.6	24	7.8	15	250	
" "	" "	" 31	1,400	10.5	8.0	71.7	4.9	91	7.7	32	219	
" "	" "	Nov. 6	930	7.0	9.2	76.0	3.4	240	7.7	25	229	
" "	" "	" 8	960	7.5	9.4	78.5	3.4	460	7.7	15	243	
" "	" "	" 14	860	7.0	9.9	81.6	2.7	150	7.7		253	
" "	" "	" 20	860	8.0	9.0	76.1	2.9	23	7.7	25	243	
" "	" "	" 22	1,040	7.0	9.8	80.9	3.5	24	7.8	17	242	
" "	" "	" 28	920	5.0	9.9	77.3	3.5	240	7.8	9	264	
" "	" "	Dec. 4	1,130	6.0	9.6	76.8	3.4	93		15	248	
" "	" "	" 6	1,100	6.0	9.6	76.8	3.3	93		18	250	
" "	" "	" 12	900	7.0	9.3	76.2	3.0	93	7.9	11	245	
" "	" "	" 18	890	8.0	9.7	81.7	3.6	15	7.8	5	249	
" "	" "	" 20	890	5.5	9.2	72.7	2.6	93	7.6	7	250	
" "	" "	" 26	800	2.5	11.1	81.3	3.3	150	7.4	15	257	
" "	" "	Jan. 3	617	0.0	12.1	82.9	1.6	43	7.8	9	269	
" "	" "	" 17	4,630	1.0	13.3	93.7	6.6	460	7.6	380	161	
" "	" "	Feb. 2	1,040	1.0	9.4	66.2	4.9	43	8.0			
" "	" "	" 12	11,[illegible]50	3.0	12.3	91.4	7.4	230	7.6			
" "	" "	" 19	18,240	5.0	12.8	100.0	6.9	240	7.8	850	104	
" "	" "	" 26	2,820	2.0	12.5	90.3	3.0	460	7.7	48	195	
" "	" "	" 28	4,410	3.0	11.8	87.5	5.2	240	7.8	57	214	
" "	" "	Mar. 5	22,400	5.0	11.4	89.3	4.0	39	7.6	700	105	
" "	" "	" 11	4,350	5.0	11.4	88.8	3.1	1,100	8.0	67	210	
" "	" "	" 13	3,730	5.0	11.3	88.5	4.2	11,000	7.9	40	216	
" "	" "	" 19	3,080	8.0	10.1	84.9	5.0	430	7.9	55	225	
" "	" "	" 25	2,140	4.0	9.1	69.5	2.6	930	8.0	25		
" "	" "	" 27	2,030	6.0	11.0	87.7	4.4	240	7.8	33	236	
" "	" "	Apr. 2	2,210	8.5	9.0	76.7	3.2	23	7.8	25	230	
" "	" "	" 8	4,210	12.0	9.5	87.9	4.2	150	7.9	30	225	
" "	" "	" 10	5,850	9.5	9.1	79.6	5.4	1,100	7.9	65		
" "	" "	Apr. 30	5,240	14.0	--	--	6.3	460	7.9	140	222	

Results above Dayton submitted by Dayton Sewage Disposal Plant.

** Less than one.

LITTLE MIAMI RIVER BASIN

Final Report to the Ohio River Committee

Ohio River Pollution Survey

U. S. Public Health Service
Cincinnati, Ohio
1942

LITTLE MIAMI RIVER BASIN

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LITTLE MIAMI RIVER BASIN*

Syllabus and Conclusions

Syllabus

The Little Miami Drainage Basin, occupying 1,755 square miles wholly within the State of Ohio, is principally an agricultural region with only minor industrial development. Exclusive of the Cincinnati metropolitan area, the population of the basin totals about 135,000, of which 35 percent reside in 41 incorporated communities. Primary water uses of major streams are recreational and agricultural. Recreational development is notable in the lower reaches. In terms of expenditures, existing waste treatment facilities represent about 50 percent of total suggested treatment. Remaining water pollution problems are not critical, are of local significance, and can be solved by practical methods of waste treatment.

Conclusions

(1) Of 21 public water supplies in the basin only four use surface sources, two of which are on tributaries affected by sewage pollution. An increasing need for surface waters for water supply purposes is noted in the basin as well as demands for improved recreational areas, the latter especially in the lower reaches near Cincinnati.

(2) Outside the Cincinnati area, sewage from 31,700 people and industrial wastes with a population equivalent of 9,700 enter the streams. More than 75 percent of the sewage is treated.

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* For maps of this Basin, see Miami River Basin.

(3) Laboratory observations show several bad areas below sources of pollution but indicate rather rapid stream recovery after short periods of flow. Coliform results averaging over 200 per ml. during the worst month were found over most of the basin.

(4) Minimum monthly summer flows in the lower reach have varied from 70 c.f.s. to 85 c.f.s. for several years within the period of record. Flows on East Fork often reach zero for extended periods.

(5) The Little Miami River below mile 5 receives pollution aggregating about 129,000 equivalent population from a portion of metropolitan Cincinnati. Interceptor sewers are under construction to divert this waste to a point of treatment with subsequent discharge direct to the Ohio River.

(6) Sections of several tributaries are polluted due to improper waste treatment. Practical treatment of sewage and industrial waste will control pollution and adequately protect surface streams for all normal uses except in certain sections of tributaries where near-zero summer flows occur in the vicinity of outfalls.

(7) Low-flow regulation by the proposed East Fork flood-control reservoir would eliminate the need for more than primary sewage treatment at Batavia, would ensure the adequacy of the community's public water supply and would enhance the recreational value of the East Fork.

(8) In view of the normal uses of the streams involved, refined treatment at a few sources of pollution would serve no purpose commensurate with the expenditure. In these instances, lesser treatment appears justified and has been suggested. Summary of comparative cost of remedial measures from Table Lm-1 follows:

Treatment	Capital Cost	Annual Charges
Existing	$530,000	$55,000
Suggested additional	580,000	60,000

Estimated additional costs, over existing charges, of programs involving uniform treatment throughout the basin, are:

Primary, All Places	$420,000	$45,000
Secondary, All Places	620,000	65,000

Table Lm-1 Little Miami River Basin - Estimated Cost of Existing and Suggested Minimum Corrective Measures for Sewage and Industrial Wastes, with Comparative Costs for Primary and Secondary Treatment.

	Number of Plants Prim.Sec.	Population Connected to Sewers	Capital Investment (Dollars)	Annual Charges (Dollars)		
				Amort. & Interest	Operation & Main.	Total
Existing Sewage Treatment	3 8	24,600	530,000	35,000	20,000	55,000
Suggested Minimum Correction						
Sewage Treatment Plants	3 8	7,100	410,000	29,000	16,000	45,000
Required Interceptors		6,700	120,000	5,000	-	5,000
Independent Industrial Waste Correction		-	50,000	6,000	4,000	10,000
Total	-	-	580,000	40,000	20,000	60,000
Comparative Cost						
Primary Treatment all waste	-	-	420,000	30,000	15,000	45,000
Secondary Treatment all waste	-	-	620,000	45,000	20,000	65,000
As Suggested	-	-	580,000	40,000	20,000	60,000

Description

The Little Miami River, draining 1,755 square miles in southwestern Ohio, rises in Clark County and flows southwesterly for about 100 miles to join the Ohio River near the eastern city limits of Cincinnati. The generally uniform stream bed, free from significant rapids, is 1,150 feet above mean sea level near headwaters and has a uniform gradient of about 6.5 feet per mile.

Major Tributaries	River Mile	Drainage Area Sq.Mi.
East Fork	12	501
Todd Fork	39	261
Caesar Creek	51	239

	Populations			
Larger Cities	1910	1920	1930	1940
Xenia	8,706	9,110	10,507	10,633
Wilmington	4,491	5,037	5,332	5,971
Lebanon	2,698	3,396	3,222	3,890
Total Basin				
Rural	97,144	93,867	99,991	111,470
Urban	21,088	17,543	19,061	24,004
Total	118,232	111,410	119,052	135,474

Industries - Municipalities in the basin are essentially trading and distributing centers. Agriculture is the chief basin occupation and corn and garden truck are principal crops. Cattle, sheep and hogs are raised in large numbers. Waste by-products from vegetable canneries is of special stream pollution significance and operating seasons coincide with critical stream conditions.

Water Uses - Three communities on East Fork with a combined population of 1,700 and one on Todd Fork with a population of 1,500 use surface streams as a source of water supply. Stock watering from surface streams is common throughout the basin.

Recreation, including fishing, summer cottages and boating is observed in the basin with special concentration in the lower reach near metropolitan Cincinnati.

Navigation improvements are not considered on this stream. Flood control reservoirs at five sites on the Little Miami River and its tributaries have been studied by the U. S. Engineer Department.

Presentation of Field Data

Figure Mi-1 shows the location and magnitude of each source of pollution of consequence in the basin. Figure Lm-2 shows similar data and, in addition, the location of water supply intakes from streams below source of pollution and laboratory data on coliform organisms, dissolved oxygen and B. O. D.

Water Supply - In the basin, 21 public water supply systems serve 39,100 people. Supplies shown in Table Lm-2 are from surface streams. Greater future use of surface waters is indicated. Ground water is limited in many sections, and is generally hard with high iron content.

Table Lm-2 Little Miami River Basin - Surface Water Supplies

Municipality	Source	Mile (1)	Treatment (2)	Population Served	Consumption M.G.D.
Supplies Below Community Sewer Outfalls					
Batavia	East Fork	23	FD	1,100	0.07
Williamsburg	" "	45	FD	400	0.03
Other Surface Supplies					
St. Martin	Impounded	-	FD	200	0.01
Blanchester	"	-	FD	1,500	0.05
Total - Below Sewer Outfalls				1,500	0.10
Other				1,700	0.06
Total - Surface Water Supplies				3,200	0.16

(1) Miles above mouth of Little Miami River.
(2) F - Coagulated, settled, filtered, D- Chlorinated.

Sewage - Table Lm-3 shows the population served by sewers at each of the more important sources of pollution in the basin. Cincinnati and its suburbs are the largest contributors of wastes. Interceptor construction now in progress will remove these wastes from the Little Miami. After treatment they will be discharged to the Ohio River. Sewage from 31,700 people in other communities enters the streams of the basin and of these, 24,600 are served by the eleven sewage treatment plants.

Table Lm-3 Little Miami River Basin - Sources of Significant Pollution Including Industrial Waste Expressed as Sewered Population Equivalent (B.O.D.).

Municipality		River	Miles Above Mouth of L. Miami R.	Population Connected to Sewers	Treatment	Sewered Population Equivalent (B.O.D.)	
						Untreated	Discharged
Cincinnati & Suburbs		Little Miami	5	78,000	None	129,000	129,000
Milford		" "	14	1,500	"	1,500	1,500
Waynesville	(1)	" "	54	500	Secondary	2,000	1,600
Roxanna		" "	60	-	"	1,500	1,500
Yellow Springs		" "	84	1,000	Secondary	1,000	100
New Vienna		East Fork	90	400	None	1,400	1,400
Lebanon	(1)	Turtle Creek	40	3,100	Chem.Prec.	5,300	2,600
Blanchester		Second Creek	50	1,200	None	2,000	2,000
Wilmington		Lytle Creek	63	5,000	Chem.Prec.	6,110	1,800
Jamestown		Caesar Creek	82	900	Secondary	1,500	700
Xenia		Shawnee Creek	80	11,000	"	11,000	1,600
Orphans Home		" "	82	1,000	"	1,000	100
Wilberforce		Massie Creek	82	1,000	"	1,000	100
11 Smaller Sources		-	-	5,100	Various	6,100	5,100
Total				109,700		170,400	149,100

(1) Recent treatment plant. Not in operation in 1939.

FIG. Lm-2

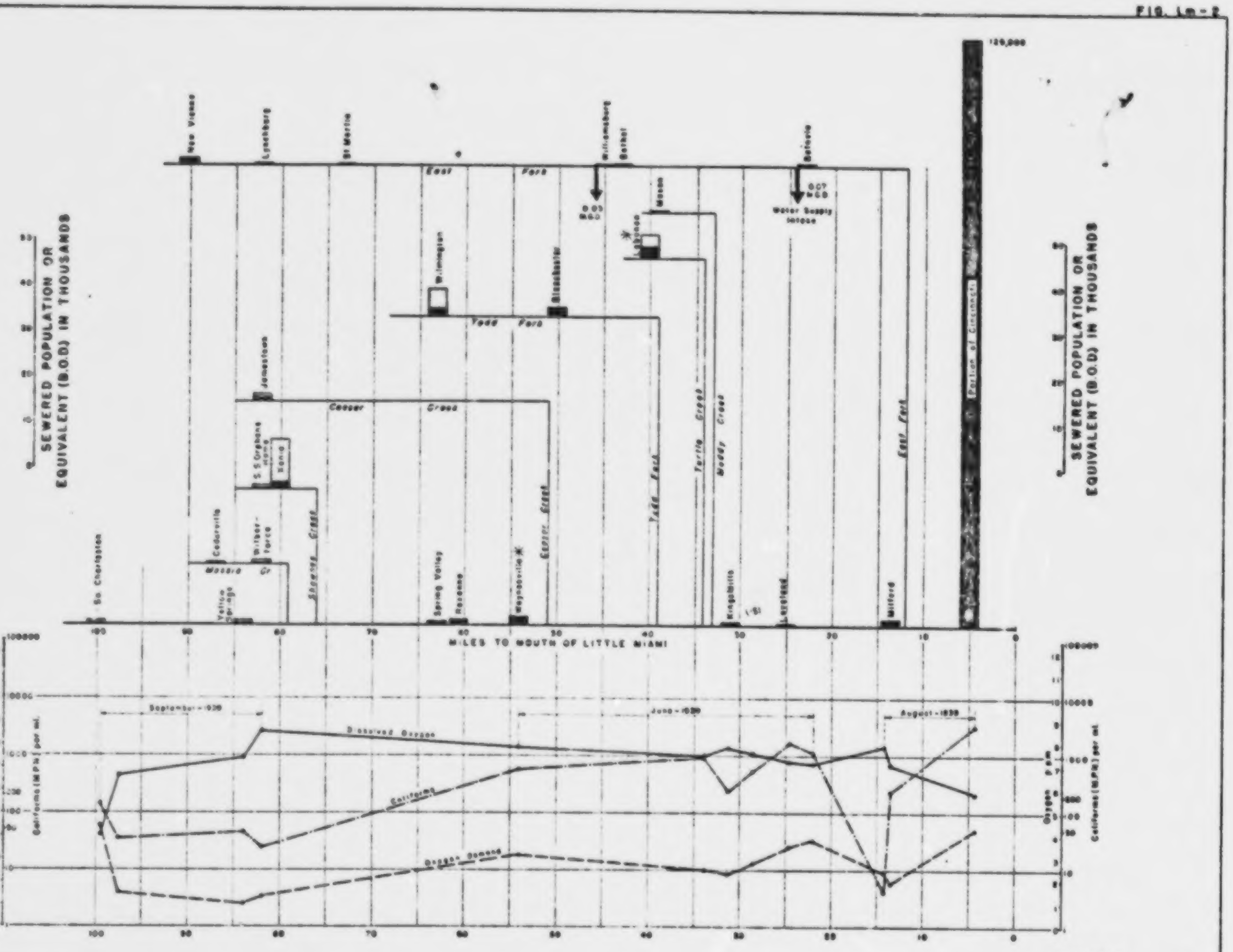

FIGURE Lm 2
LITTLE MIAMI RIVER
SOURCES OF POLLUTION
AND
SELECTED LABORATORY RESULTS
OHIO RIVER POLLUTION SURVEY
U.S. PUBLIC HEALTH SERVICE

5TC-17

Industrial Wastes - The only industries discharging wastes of consequence other than to municipal treatment plants and outside the Cincinnati area are eight vegetable canneries. In addition, two vegetable canneries discharge wastes to municipal treatment works. Four others have taken steps to reduce the strength of the wastes before they leave the plant. Table Lm-4 shows data on the industrial waste load in the basin.

Table Lm-4 Little Miami River Basin - Summary of Industrial Wastes not Discharging to Municipal Treatment Plants, with Total of Entire Industrial Waste Load in the Basin

Industry	Number of Plants	Industrial Waste Disposal		At Least Minor Corrective Measures Taken	Estimated Sewered Population Equivalent (B.O.D.)
		Munic. Sewers	Private Outlets		
Canneries	8	1	7	4	6,900
Waste Unconnected Munic. Treatment	8	1	7	4	6,900
Industrial Waste to Cincinnati Sewers (1)					51,000
Waste Discharged to Municipal Treatment					2,800
Total Industrial Wastes in the Basin					60,700

(1) Industries not surveyed individually. Population equivalent based on comprehensive sewer gaging and sampling program of city.

Presentation of Laboratory Data

The laboratory data for the Little Miami River Basin are summarized in Table Lm-7. Selected results of the analytical observations are shown in Table Lm-5 to depict typical low flow conditions at major points on the Little Miami River and major tributaries. Spot symbol maps showing the most unfavorable monthly average coliform, dissolved oxygen and B.O.D. results are presented in Figures Mi-3, Mi-4 and Mi-5 respectively.

At most stations in the basin, monthly average coliform results exceeding 200 per ml. were observed during at least one month. High results were obtained from April to August, 1939 and low results from September, 1939 to April, 1940. The most rapid coliform reduction in the stretches below sources of pollution occurred during the period, August, 1939 through January, 1940 when discharges were low.

The dissolved oxygen results were generally more favorable than the coliform results. While complete oxygen depletion was observed below Lebanon and Bethel and monthly averages of less than 3.0 p.p.m. were observed below Wilmington, Jamestown, Xenia, Lynchburg, and at Beechmont, reaeration appears to bring about a recovery in dissolved oxygen within comparatively short distances below sources of pollution.

Maximum monthly average B.O.D. results of more than 5.0 p.p.m. were found at 49 percent of the stations in the basin. At 30 percent of the stations the highest monthly average was from 3.1 to 5.0 p.p.m. and at 21 percent of the stations it was less than 3.0 p.p.m. The highest results, 93, 46, and 43 p.p.m., were observed below Wilmington, Lebanon, and Bethel, respectively. However, except below a few sources of pollution, such as Xenia and the above three municipalities, few results were in excess of 3.0 p.p.m. so the picture as presented by the most unfavorable monthly average is somewhat darker than was actually the case over much of the sampling period.

Samples from Beechmont were influenced by sewage from the Cincinnati area. Results obtained during January, 1940 over the entire basin were influenced by the extremely cold weather and by ice in the streams.

Biological Summary - The plankton of the Little Miami River were found to be abundant in species and numbers. The main stream is well supplied with fertilizer by the several small towns along its banks and average plankton volumes at the various sampling stations ranged from 2,000 to 6,000 p.p.m. The plankton in the tributaries was somewhat less except in Turtle Creek at South Lebanon where the population rose to 77,000 p.p.m. on one day.

Table Lm-5 Little Miami River - Selected Laboratory Data - Main Stream and Tributaries

River Location	Little Miami		Little Miami		Little Miami		L. Miami Beechmont Bridge
	above	below	above	below	above	below	
	Yellow Springs		Turtle Creek		Milford		
River Miles Above:							
Mouth of Little Miami	85.5	84	33.8	31.2	14.2	13.3	4.3
Period - 1939	July-Sept.	July-Sept.	August	August	August	August	Sept.Oct.
Number of Samples	3	3	3	3	1	1	4
Flow in c.f.s.:							
Sampling Days	64	64	1.0	1.0	105	105	125
Minimum Month					57.5	57.5	72
Water Temperature °C.	19.8	18.5	22.8	23.5	23.5	23.5	17.6
Coliforms per ml.	31	21	47	18	4	23	4,580
Dissolved oxygen p.p.m.	7.6	8.2	7.8	8.3	7.9	9	2.8
B.O.D., 5-day, p.p.m.	0.9	1.2	1.3	1.5	2.7	2.9	6.5

River Location	Shawnee Cr. below Xenia	Todd Fork		East Fork		East Fork	
		above	below	above	below	above	below
		Wilmington		Lynchburg		Batavia	
River Miles Above:							
Conf. with L. Miami	1	27.5	20.5	73	68	13	8
Mouth of Little Miami	76.1	66.5	59.5	85	80	25	20
Period - 1939	August	October	October	October	October	Sept.	Sept.
Number of Samples	2	2	2	1	1	1	1
Flow in c.f.s.:							
Sampling Days	1.0	1.0	1.0	1.0	1.0	1.5	1.5
Minimum Month							1.3
Water Temperature °C.	20.5	12.0	10.8	20.0	21.0	19.0	19.0
Coliforms per ml.	23,500	1,275	2,765	23	4	64	9
Dissolved oxygen p.p.m.	5.2	2.7	1.6	2.5	5.6	6.2	4.4
B.O.D., 5-day, p.p.m.	6.7	4.6	16.2	3.5	3.2	2.5	3.8

Hydrometric Data

Of the three gaging stations in the basin, two are on the Little Miami at Milford and Spring Valley and one on East Fork at Perintown. Springs in headwaters influence critical low flows in the Little Miami, but flows in East Fork are extremely erratic with long periods of near zero discharge.

Table Lm-6 Little Miami River Basin - Monthly Mean Summer Flows (c.f.s.) at Gaging Stations for Years in Which Low Summer Flows have Occurred.

River Location	Little Miami above E. Fork at Milford	Little Miami near town Spring Valley	East Fork near town Perintown
River Miles Above:			
Conf. with L.Miami	-	-	6
Mouth of L. Miami	14	63	18
Drain. Area Sq.Mi.	1,195	361	477
Period of Record	1924-1939	1925-1936	1924-1939
Year	1930	1930	1930
June c.f.s.	150	84	4.3
July "	78	53	* 1.3
August "	78	44	1.8
September "	123	44	14
Year	1936	1932	1936
June "	147	419	12
July "	86	350	4.4
August "	-	61	19
September "	-	49	64
Year	1939	1934	1939
June "	1,240	44	157
July "	936	69	124
August "	191	231	41
September "	* 70	* 35	* 1.3

* Minimum Flow.

Proposed Stream Control - Five proposed flood control reservoirs on the Little Miami River and its tributaries have been studied by the U. S. Engineer Department as follows:-

Reservoir	Stream	Miles above Mouth of L. Miami R.
Washington Mills	Little Miami	68
Caesar Creek	Caesar Creek	53
Morrow	Little Miami	40
Todd Fork	Todd Fork	43
East Fork	East Fork	44

Increased low flow from these reservoirs would be beneficial to the extensive recreational uses of the Little Miami River and its tributaries. However, only the East Fork Reservoir would create tangible monetary benefits to pollution abatement by reducing the extent of treatment needed for pollution control.

Discussion

Pollution problems in the basin are minor and of local significance and can be solved by practical treatment methods. Industrial waste is limited to 8 relatively small seasonal canneries and the waste problem can be corrected by chemical treatment or ponding with controlled diversion. All industrial waste is discharged to tributary streams.

Little Miami River below East Fork - This section is the most highly polluted in the basin. Below mile 5 the Cincinnati Metropolitan District contributes a population load of 129,000. Cincinnati is constructing intercepting sewers to divert this waste to a point of treatment with subsequent discharge direct to the Ohio River.

East Fork - With extended periods of near zero flow on the East Fork (Table Lm-6) the sources of pollution, although minor, will require fairly complete treatment to control local nuisance conditions during summer drouths. Normal stream uses are restricted to stock watering and limited recreation. Low stream discharges limit the value of the stream for recreation. At Batavia secondary treatment is needed and appears justified by stream uses below the outfall.

Primary treatment would be sufficient at Batavia if the proposed East Fork reservoir is operated for low-flow control incidental to flood control. Such operation would require no additional cost in reservoir construction and would ensure the adequacy of Batavia's public water supply taken from the East Fork. Intangible benefits would be substantial. The flows would provide dilution for residual pollution and would increase the recreational value of the lower East Fork and Little Miami Rivers.

Little Miami above East Fork - Minor pollution problems exist due to inadequate waste treatment below Blanchester, Lebanon, Wilmington, and Xenia. These problems are purely local and can be corrected by secondary treatment at Blanchester and additions or improvements to existing facilities at the other three places.

Cost estimates for remedial measures are summarized in Table Lm-1.

TABLE Lm-7 LITTLE MIAMI RIVER BASIN

OHIO RIVER POLLUTION SURVEY
LABORATORY DATA

SUMMARY OF INDIVIDUAL RESULTS

Sampling Point	Mileage from Mouth		Date 1939	Average Discharge c.f.s.	Temp. °C	Dissolved Oxygen		5 Day B.O.D. p.p.m.	Coliform M.P.N. Per ml	pH	Turbidity p.p.m.	Alkalinity p.p.m.	Hardness p.p.m.
						p.p.m.	% Sat.						
L. Miami River, above South Charleston, Ohio	Lm	95.5	Sept. 7	1	18.0	4.0	41.4	4.4	150	7.9			
" "	"	"	Oct 4	1	16.0	7.5	75.7	2.5	460	7.6			
" "	"	"	Nov. 1	1	7.5	13.8	114.6	1.6	73	8.3			
" "	"	"	Dec. 12		2.0	16.6	120.1	1.6	15	8.0			
" "	"	"	1940 Jan. 11		0.0	8.6	58.7	0.6	9	7.7			
Little Miami R. Below South Charleston, Ohio	Lm	97.5	1939 Sept. 7	1	19.5	6.6	70.7	1.5	36	7.9			
" "	"	"	Oct. 4	1	20.5	9.5	104.6	5.5	110	8.3			
" "	"	"	Nov. 1	1	8.0	12.1	101.6	2.2	79	8.3			
" "	"	"	Dec. 12		2.0	14.9	107.4	2.2	43	8.1			
" "	"	"	1940 Jan. 11		0.0	12.2	83.4	0.9	460	7.7			
Little Miami R. Above Yellow Springs, Ohio	Lm	64	1939 July 28		24.0	7.4	87.5	0.7	23				
" "	"	"	Aug. 25		21.5	8.1	91.4	0.8	24	8.1			
" "	"	"	Sept. 22		14.0	7.4	71.1	1.0	46	7.9			
" "	"	"	Oct. 20		12.5	Lost	—	0.0	8	7.7			
" "	"	"	Nov. 17		7.0	10.1	82.7	0.6	1	7.6			
" "	"	"	Dec 29		2.0	10.5	75.6	0.4	9	7.7			
Little Miami R. Below Yellow Springs, Ohio	Lm	62	July 28	155	22.0	7.3	82.9	0.8	36				
" "	"	"	Aug. 25	22	19.5	8.8	95.1	1.4	4	8.1			
" "	"	"	Sept. 22	14	14.0	8.5	81.8	1.3	24	8.0			
" "	"	"	Oct. 20	19	10.0	10.1	89.4	0.8	4	7.9			
" "	"	"	Nov. 17	21	4.5	13.0	100.1	0.5	1	7.9			
" "	"	"	Dec. 29		1.0	14.3	100.3	1.3	4	8.0			
Shawnee Creek - above Xenia, Ohio	LmS	80.6	June 22		25.0	8.0	95.2	1.4	460				
" "	"	"	" 29		22.0	7.3	93.1	2.9	1,100				
" "	"	"	July 17		18.5	6.2	65.7	1.2	36				
" "	"	"	" 28		24.5	6.8	80.2	1.5	73				
" "	"	"	Aug. 14		24.5	5.5	64.6	1.4	240	8.0			
" "	"	"	" 25		17.5	4.5	46.3	1.8	93	8.1			
" "	"	"	Sept. 22		16.0	6.9	69.1	1.0	24	8.0			
" "	"	"	Oct. 20		12.5	7.5	70.2	3.3	4	7.9			
" "	"	"	Nov. 17		6.5	11.3	92.0	1.0	24	7.8			
" "	"	"	Dec. 29		1.0	11.7	82.0	1.6	4	7.8			
Shawnee Creek - below Xenia, Ohio	LmS	78.1	June 22		24.0	6.6	78.0	6.4	4,600				
" "	"	"	" 29		24.5	7.3	81.6	5.3	11,000				
" "	"	"	July 17	3	19.0	7.1	75.9	1.8	360				
" "	"	"	" 28	3	24.5	6.1	73.0	1.8	360				
" "	"	"	Aug. 14	1	24.0	5.4	63.3	3.6	230	7.9			
" "	"	"	" 25	1	17.5	2.4	24.3	3.7	1,500	7.3			
" "	"	"	Sept. 22	1	16.0	5.2	52.3	1.4	24	7.9			
" "	"	"	Oct. 20	1	13.0	2.6	24.9	5.4	46	7.6			
" "	"	"	Nov. 17	1	7.5	4.3	35.9	4.4	43	7.6			
" "	"	"	Dec. 29		1.0	5.6	39.4	11.0	230	7.5			

TABLE Lm-7 LITTLE MIAMI RIVER BASIN

OHIO RIVER POLLUTION SURVEY
LABORATORY DATA

SUMMARY OF INDIVIDUAL RESULTS

Sampling Point	Mileage From Mouth		Date 1939	Average Discharge c.f.s.	Temp. °C	Dissolved Oxygen		5 Day B.O.D. p.p.m.	Coliform M.P.N. Per ml	pH	Turbidity p.p.m.	Alkalinity p.p.m.	Hardness p.p.m.
						p.p.m.	% Sat.						
Shawnee Creek - below Xenia, Ohio	LmB	76.1	June 22		24.5	7.1	84.4	5.1	11,000				
" "	"	"	" 29		21.5	7.1	79.3	5.0	11,000				
" "	"	"	July 17		17.0	6.2	63.7	7.8	1,500				
" "	"	"	" 28		22.0	6.6	75.3	6.8	930				
" "	"	"	Aug. 14		23.5	6.5	75.9	7.2	930	8.0			
" "	"	"	" 25		17.5	3.9	40.1	6.2	46,000	7.8			
" "	"	"	Sept 22		15.0	6.9	67.7	6.8	240	8.0			
" "	"	"	Oct. 20		13.0	4.8	45.6	5.6	1,100	7.8			
" "	"	"	Nov. 17		8.0	6.3	52.8	5.7	750	7.7			
" "	"	"	Dec 29		2.0	7.0	50.5	6.5	11,000	7.6			
Little Miami River, Waynesville, Ohio	Lm	54	Feb. 20		7.5	10.4	86.2	3.8	150				
" "	"	"	" 23		1.0	13.2	93.1	1.6	93				
" "	"	"	" 28		6.5	11.8	96.0	3.6	93				
" "	"	"	Mar. 8		6.5	11.9	96.5	1.3	4				
" "	"	"	" 16		7.5	10.8	89.5	0.6	23				
" "	"	"	Mar. 24		11.5	10.7	98.0	36					
" "	"	"	" 28		9.0	11.8	101.8	1.5	43				
" "	"	"	Apr. 3		8.5	11.5	98.3	0.6	4				
" "	"	"	" 13		7.5	12.1	100.7	1.2	43				
" "	"	"	" 19		8.5	10.6	90.3	2.0	93				
" "	"	"	" 25		15.5	9.1	90.9	0.9	75				
" "	"	"	May 5		14.0	10.1	97.7	1.0	9				
" "	"	"	" 11		15.5	8.9	88.5	1.1	24				
" "	"	"	" 15		16.0	9.7	97.6	1.2	15				
" "	"	"	" 23		21.5	8.0	90.0	1.3	3				
" "	"	"	" 29		21.5	7.5	85.1	1.8	46				
" "	"	"	June 8		23.5	7.3	84.9	1.3	15				
" "	"	"	" 14		16.5	8.4	84.9	5.0	1,100				
" "	"	"	1940 Jan. 18		0.0	Lost	—	1.9	240	7.8			
" "	"	"	" 31		0.0	12.5	85.5	0.8	23	7.9			
" "	"	"	Feb. 6		1.0	12.7	89.5	5.4	230	7.6			
" "	"	"	Feb. 16		1.0	13.6	95.7	1.2	43	8.0			
" "	"	"	" 23		3.5	12.9	97.0	1.0	210	7.8			
" "	"	"	" 29		5.0	12.7	99.2	1.4	43	7.8			
" "	"	"	Mar. 6		4.0	12.2	92.8	1.5	240	7.6			
" "	"	"	" 12		1.5	12.3	87.8	1.1	9	7.8			
" "	"	"	" 18		13.0	12.1	114.0	0.6	8	8.0			
" "	"	"	" 26		8.0	13.5	113.7	1.0	4	7.8			
" "	"	"	Apr. 3		16.0	10.0	100.5	1.2	24	8.0			
South Caesar Cr. above Jamestown, Ohio	LmC	83	1939 Aug. 14		23.0	3.1	35.4	8.7	1,100				
" "	"	"	" 25		18.0	3.4	35.8	3.1	36	7.5			
" "	"	"	Oct. 4		15.0	3.0	29.1	4.8	43	7.7			
" "	"	"	Nov. 1		5.0	3.2	25.2	4.5	9	7.5			
" "	"	"	Dec. 12		2.0	9.0	65.2	1.6	**	7.7			
" "	"	"	1940 Jan. 11		0.0	1.7	11.6	1.3	1	7.5			

TABLE Lm-y LITTLE MIAMI RIVER BASIN

OHIO RIVER POLLUTION SURVEY
LABORATORY DATA

SUMMARY OF INDIVIDUAL RESULTS

Sampling Point	Mileage From Mouth		Date 1939	Average Discharge c.f.s.	Temp. °C	Dissolved Oxygen p.p.m.	Dissolved Oxygen % Sat.	5 Day B.O.D. p.p.m.	Coliform M.P.N. Per ml	pH	Turbidity p.p.m.	Alkalinity p.p.m.	Hardness p.p.m.
S. Caesar Creek, below Jamestown, Ohio	LmC	81.5	Aug. 14	1	22.5	1.8	21.1	5.0	460				
" "	"	"	" 25	1	17.0	3.1	32.2	5.3	250	7.7			
" "	"	"	Oct. 4	1	12.0	3.4	31.4	5.3	4,600	7.6			
" "	"	"	Nov. 1	1	5.0	9.1	70.9	3.6	230	7.7			
" "	"	"	Dec. 12		1.5	13.5	96.2	2.4	23	8.1			
" "	"	"	1940 Jan. 11		0.0	5.2	35.5	1.6	9	7.7			
Lyttle Creek - above Wilmington, Ohio	LmL	66.5	1939 June 21		23.5	7.2	84.3	5.7	2,400				
" "	"	"	" 29		23.5	7.9	91.7	1.5	240				
" "	"	"	July 17		18.0	9.1	95.2	1.0	230				
" "	"	"	" 27		24.5	8.9	105.3	1.4	91				
" "	"	"	Aug. 16		21.5	4.5	50.8	2.8	240	7.6			
" "	"	"	Sept. 5		18.5	0.5	5.4	8.0	930				
" "	"	"	Oct. 2		15.0	3.8	27.6	3.5	2,400	7.5			
" "	"	"	" 30		9.0	2.7	23.0	5.7	150	7.3			
" "	"	"	Dec. 8		3.0	9.1	67.5	2.1	36				
" "	"	"	Jan. 9		0.0	1.0	6.8	5.5	93				
Lyttle Creek - Below Wilmington, Ohio	LmL	59.5	1939 June 21		24.0	7.9	92.4	2.2	230				
" "	"	"	" 29		23.5	7.6	87.8	3.7	1,500				
" "	"	"	July 17	2	21.5	12.9	144.8	1.4	36				
" "	"	"	" 27	2	25.5	9.5	114.8	4.4	430				
" "	"	"	Aug. 16	1	23.0	9.4	108.3	1.3	36	8.2			
" "	"	"	Sept. 5	1	18.5	8.9	94.3	6.1	93				
" "	"	"	Oct. 2	1	13.5	0.2	2.0	23.4	4,600	7.7			
" "	"	"	" 30	1	8.0	3.1	25.8	9.0	930	7.6			
" "	"	"	Dec. 8		5.0	0.8	5.9	76.3	24,000				
" "	"	"	1940 Jan. 9		1.0	2.3	16.2	93.1	110,000				
Todd Fork, Clarksville, Ohio	LmT	54	1939 Feb. 20		7.5	10.4	86.4	5.6	150				
" "	"	"	" 23		0.5	13.7	95.2	1.2	43				
" "	"	"	" 28		6.5	11.5	93.3	3.6	1,100				
" "	"	"	Mar. 8		4.5	12.9	99.3	0.9	23				
" "	"	"	" 16		5.0	12.0	93.6	0.4	43				
" "	"	"	Mar. 24		11.0	11.4	103.2	4.8	30				
" "	"	"	" 28		6.5	12.6	101.9	3.4	93				
" "	"	"	Apr. 3		7.0	11.9	98.1	0.7	43				
" "	"	"	" 13		6.0	13.1	105.3	1.0	75				
" "	"	"	" 19		8.5	11.2	95.6	1.3	75				
" "	"	"	" 25		15.0	9.9	97.7	0.8	3				
" "	"	"	May 5		14.0	10.5	101.3	1.1	3				
" "	"	"	" 11		16.5	9.0	91.8	0.7	2				
" "	"	"	" 15		16.0	9.6	96.2	0.7	8				
" "	"	"	" 23		23.0	7.6	87.3	2.4	240				
" "	"	"	" 29		23.5	8.0	93.4	1.7	23				
" "	"	"	June 8		25.0	6.8	81.6	2.6	110				
" "	"	"	" 14		16.0	8.9	89.8	3.4	460				
L. Miami R. abv. Turtle Cr. S.Lebanon, O.	Lm	33.8	June 23		22.5	7.5	86.1	2.5	930				
" "	"	"	July 7		26.5	6.8	84.2	2.6	91				
" "	"	"	" 19		21.5	7.8	87.2	2.4	430				

TABLE Lm-7 LITTLE MIAMI RIVER BASIN

OHIO RIVER POLLUTION SURVEY
LABORATORY DATA

SUMMARY OF INDIVIDUAL RESULTS

Sampling Point	Mileage From Mouth	Date 1939	Average Discharge c.f.s.	Temp. °C	Dissolved Oxygen p.p.m.	Dissolved Oxygen % Sat.	5 Day B.O.D. p.p.m.	Coliform M.P.N. Per ml	pH	Turbidity p.p.m.	Alkalinity p.p.m.	Hardness p.p.m.
L. Miami R. abv. Mou. Turtle Cr., S. Lebanon, O.	Lm 33.8	Aug. 2		23.5	7.4	86.0	1.0	91				
" "	" "	" 11		23.0	8.2	94.1	1.3	36				
" "	" "	" 30		22.0	7.6	87.9	1.6	15	8.1			
" "	" "	Sept. 27		18.5	8.0	84.4	1.6	9	7.9			
" "	" "	Oct. 25		13.5	9.3	88.6	1.5	4	7.9			
" "	" "	Nov. 22		5.5	11.5	90.7	1.3	2	8.0			
" "	" "	1940 Jan. 4		0.0	14.0	96.0	0.9	1	8.0			
Turtle Cr. above Lebanon, Ohio	LmTu 41.6	1939 June 23		21.0	7.8	86.4	1.3	150				
" "	" "	July 7		26.5	6.6	81.0	2.5	390				
" "	" "	" 19		21.5	6.5	73.0	2.1	230				
" "	" "	Aug. 2		23.5	6.7	77.4	1.0	230				
" "	" "	" 11		21.0	6.2	69.0	1.3	91				
" "	" "	" 30		18.5	5.4	57.4	4.6	93	7.6			
" "	" "	Sept. 27		15.0	5.6	55.3	1.4	5	7.5			
" "	" "	Nov. 22		8.0	8.0	67.4	2.0	2	7.5			
" "	" "	1940 Jan. 4		1.0	5.0	35.1	0.9	4	7.9			
Turtle Cr. above sewage, Lebanon, Ohio	LmTu 39.6	June 23		21.5	7.3	82.2	1.7	36				
" "	" "	July 7		25.5	6.6	79.5	2.6	91				
" "	" "	" 19		21.5	6.4	72.4	2.4	430				
" "	" "	Aug. 2		22.5	5.5	63.3	1.4	430				
" "	" "	" 11		21.5	2.4	27.2	5.9	11,000				
" "	" "	" 30		20.0	0.0	00.0	35.3	93,000				
" "	" "	Sept 27		17.0	0.0	00.0	18.3	43,000	7.5			
" "	" "	Oct. 25		13.0	3.4	32.4	4.4	360	7.6			
" "	" "	Nov. 22		7.0	0.2	1.8	45.9	24,000	7.5			
" "	" "	1940 Jan. 4		0.0	7.4	50.6	6.9	91	7.9			
" "	" "	" 24		2.0	5.8	41.8	0.8	9	7.5			
Turtle Creek, below Lebanon, Ohio	LmTu 37.8	1939 Feb. 20		8.0	10.4	88.0	2.7	240				
" "	" "	" 23		3.0	12.4	91.7	2.3	460				
" "	" "	" 28		8.0	11.0	92.4	3.2	1,100				
" "	" "	Mar 8		7.0	11.9	97.8	1.0	93				
" "	" "	Mar. 16		6.0	10.9	87.5	2.2	93				
" "	" "	" 24		13.0	8.5	80.3	2.1	2,400				
" "	" "	" 28		6.5	12.0	97.0	2.6	460				
" "	" "	Apr. 3		8.5	11.3	96.2	0.7	91				
" "	" "	" 13		6.0	12.3	98.6	1.4	93				
" "	" "	" 19		8.0	10.8	91.2	2.9	1,100				
" "	" "	" 25		15.0	8.8	86.7	1.2	240				
" "	" "	May 5		14.5	11.9	115.6	2.6	930				
" "	" "	" 11		15.0	7.1	70.0	2.6	2,400				
" "	" "	" 15		15.5	8.5	84.6	3.7	930				
" "	" "	" 23		22.0	5.3	60.0	7.5	2,400				
" "	" "	" 29		21.5	5.0	56.1	4.4	11,000				
" "	" "	June 8	3	24.5	2.7	31.7	7.6	11,000				
" "	" "	" 14	3	17.5	7.4	76.8	4.1	750				
" "	" "	" 23	3	22.0	5.1	57.8	2.1	36				
" "	" "	July 7	2	25.5	5.0	60.2	2.6	750				

TABLE LM-7 LITTLE MIAMI RIVER BASIN

OHIO RIVER POLLUTION SURVEY
LABORATORY DATA

SUMMARY OF INDIVIDUAL RESULTS

Sampling Point	Miles from Mouth	Date	Average Discharge	Temp.	Dissolved Oxygen		5 Day B.O.D.	Coliforms M.P.N.	pH	Turbidity	Alkalinity	Hardness
		1939	c.f.s.	°C	p.p.m.	% Sat.	p.p.m.	Per ml		p.p.m.	p.p.m.	p.p.m.
Turtle Creek, below Lebanon, Ohio	LmTu 37.8	July 19	2	21.5	4.7	52.7	3.3	2,400				
" "	" "	Aug. 2	1	21.0	3.8	42.7	2.8	4,600				
" "	" "	" 11	1	20.5	1.0	10.5	7.4	240,000				
" "	" "	" 30	1	19.0	0.0	00.0	79.3	150,000	7.5			
" "	" "	Sept. 27	1	17.0	0.0	00.0	46.0	240,000	7.5			
" "	" "	Oct. 2	2	13.5	0.0	00.0	38.0	23,000	7.5			
" "	" "	Nov. 22	1	7.0	1.2	9.9	15.7	15,000	7.5			
" "	" "	1940 Jan. 4		0.0	2.9	20.1	55.0	2,300	7.8			
" "	" "	" 24		0.0	7.2	48.9	29.2	11,000	7.5			
		1939										
Turtle Creek - below Lebanon, Ohio	LmTu 34.2	June 23		21.5	7.2	80.8	1.9	230				
" "	" "	July 7		25.5	6.5	78.8	2.9	930				
" "	" "	" 19		21.0	7.1	79.2	2.5	230				
" "	" "	Aug. 2		22.5	7.3	83.1	1.2	150				
" "	" "	" 11		20.5	7.2	78.7	1.8	30				
" "	" "	" 30		19.5	5.8	63.2	2.5	7	7.9			
" "	" "	Sept. 27		16.5	6.6	67.0	9.4	24	7.9			
" "	" "	Oct. 25		13.0	7.0	65.6	2.2	23	7.9			
" "	" "	Nov. 22		4.5	9.0	68.8	3.9	24	7.8			
" "	" "	1940 Jan. 4		0.0	10.1	69.1	1.2	2	7.9			
" "	" "	" 24		0.0	8.4	57.6	13.1	1,100	7.5			
		1939										
Little Miami River Kings Mills, Ohio	Lm 31.2	June 23		22.5	7.8	89.4	2.3	230				
" "	" "	July 7		26.0	7.2	87.2	2.5	150				
" "	" "	" 19		21.5	8.0	89.2	1.8	430				
" "	" "	Aug. 2		24.5	7.8	92.7	1.0	36				
" "	" "	Aug. 11		24.0	8.9	104.5	1.8	9				
" "	" "	" 30		22.0	8.3	93.7	1.5	9	8.1			
" "	" "	Sept. 27		19.5	8.2	88.0	1.3	4	8.1			
" "	" "	Oct. 25		13.5	9.2	87.7	1.5	2	8.0			
" "	" "	Nov. 22		6.5	11.3	92.0	1.4	4	7.9			
" "	" "	1940 Jan. 4		0.0	13.0	94.0	0.6	240	8.0			
Little Miami River, Foster, Ohio	Lm 28.6	Feb. 20		8.5	10.4	88.7	3.8	1,100				
" "	" "	" 23		0.0	Broken	—	2.0	93				
" "	" "	" 28		6.5	12.2	99.0	2.5	190				
" "	" "	Mar. 8		6.0	12.2	97.4	0.9	43				
" "	" "	" 16		7.0	11.1	90.9	0.9	23				
" "	" "	" 24		11.0	10.9	98.3	0.6	30				
" "	" "	" 28		7.0	12.3	100.8	4.2	240				
" "	" "	Apr. 3		7.5	11.6	96.3	0.8	36				
" "	" "	" 13		7.0	12.0	99.0	1.3	460				
" "	" "	" 19		9.5	10.8	93.8	2.1	150				
" "	" "	" 25		15.5	9.7	96.1	0.7	23				
" "	" "	May 5		14.5	10.4	101.3	1.2	9				
" "	" "	" 11		17.5	9.3	96.8	1.2	2				
" "	" "	" 15		16.0	9.4	94.5	1.4	2				
" "	" "	" 23		23.0	7.6	88.0	1.1	2				
" "	" "	" 29		23.5	6.4	75.0	1.9	46				

TABLE Lm-7 LITTLE MIAMI RIVER BASIN

OHIO RIVER POLLUTION SURVEY
LABORATORY DATA

SUMMARY OF INDIVIDUAL RESULTS

Sampling Point	Mileage From Mouth	Date 1939	Average Discharge c.f.s.	Temp. °C	Dissolved Oxygen p.p.m.	Dissolved Oxygen % Sat.	5 Day B.O.D. p.p.m.	Coliforms M.P.N. per ml	pH	Turbidity p.p.m.	Alkalinity p.p.m.	Hardness p.p.m.
Little Miami River, Foster, Ohio	Lm 28.6	June 8		25.0	7.1	85.1	1.5	9				
" "	" "	" 14		16.5	8.0	81.0	4.1	1,100				
" "	" "	1940 Jan. 18		0.0	Lost	—	3.5	460	7.6			
" "	" "	" 31		0.0	12.9	88.2	1.6	43	8.0			
" "	" "	Feb. 8		1.0	11.9	83.8	6.8	230	7.5			
" "	" "	" 16		1.5	14.1	100.3	1.7	43	7.9			
" "	" "	" 23		2.5	13.6	99.7	1.1	43	7.8			
" "	" "	" 29		4.0	13.6	103.4	3.0	150	7.7			
" "	" "	Mar. 6		4.0	12.8	97.5	1.7	93	7.6			
" "	" "	" 12		3.0	12.6	93.5	0.6	9	7.9			
" "	" "	" 18		12.0	11.6	107.1	0.6	1	7.9			
" "	" "	" 26		6.5	13.8	109.6	0.9	2	8.2			
" "	" "	Apr 3		16.0	9.3	93.7	1.6	93	8.0			
Little Miami River, above Loveland, O.	Lm 24.6	1939 June 22		24.0	7.1	82.9	4.1	2,400				
" "	" "	" 29		23.5	7.2	84.1	2.8	1,100				
" "	" "	July 17		24.0	10.7	125.8	2.7	36				
" "	" "	" 28		26.0	6.5	79.3	4.1	2,100				
" "	" "	Aug. 28		22.5	7.9	90.3	1.7	36	8.1			
" "	" "	Sept. 25		20.0	9.4	102.7	4.5	5	7.9			
" "	" "	Oct. 23		12.0	9.7	89.6	1.8	9	8.0			
" "	" "	Nov. 20		6.5	12.2	99.0	2.0	1	8.0			
" "	" "	1940 Jan. 2		0.0	15.5	105.8	0.8	**	8.0			
Little Miami R. below Loveland, Ohio	Lm 23.6	1939 July 28	1,455	25.0	6.4	76.6	4.3	4,600				
" "	" "	Aug. 28	89	22.5	7.9	90.6	1.7	36	8.1			
" "	" "	Sept. 25	57	19.5	9.7	105.0	3.6	5	8.2			
" "	" "	Oct. 23	58	12.0	9.7	89.6	1.8	2	8.0			
" "	" "	Nov. 20	93	7.0	11.9	97.8	1.1	2	8.0			
" "	" "	1940 Jan. 2		0.0	15.0	102.9	0.6	24	8.0			
Little Miami R. below Loveland, Ohio	Lm 22.0	June 22		24.0	7.1	83.4	3.7	1,100				
" "	" "	" 29		23.5	7.1	82.3	3.8	1,100				
" "	" "	July 17	1,455	25.0	10.7	127.7	3.1	36				
Little Miami River, above Milford, O.	Lm 14.2	Aug. 28		23.5	7.9	92.1	2.6	3	8.1			
" "	" "	Sept. 26		20.5	8.4	92.2	3.9	5	7.9			
" "	" "	Oct. 23		12.5	9.5	86.7	2.5	1	8.1			
" "	" "	Nov. 20		7.0	11.8	97.3	1.3	24	8.0			
" "	" "	1940 Jan. 2		0.0	15.5	105.8	0.0	43	8.0			
Little Miami River, below Milford, O.	Lm 13.5	1939 Feb. 20	12,100	8.5	10.4	89.1	3.7	75				
" "	" "	" 23	1,700	0.0	Broken	—	1.3	43				
" "	" "	" 28		6.5	12.4	101.0	2.2	43				
" "	" "	Mar. 8	1,100	5.0	11.2	87.1	1.0	43				
" "	" "	" 16	1,300	6.0	11.0	84.5	1.0	9	8.2	63	202	
" "	" "	" 24	400	9.5	10.9	95.1	1.2	30	8.0	7	254	

TABLE Lm-7 LITTLE MIAMI RIVER BASIN

OHIO RIVER POLLUTION SURVEY
LABORATORY DATA

SUMMARY OF INDIVIDUAL RESULTS

Sampling Point	Mileage From Mouth	Date 1939	Average Discharge c.f.s.	Temp. °C	Dissolved Oxygen p.p.m.	Dissolved Oxygen % Sat.	5 Day B.O.D. p.p.m.	Coliform M.P.N. Per ml.	pH	Turbidity p.p.m.	Alkalinity p.p.m.	Hardness p.p.m.
Little Miami R. below Milford, O.	Lm 13.5	Mar. 28	4,700	6.0	12.1	97.0	4.5	240	8.2	600	91	
" "	" "	Apr. 3	1,100	7.0	11.5	94.2	0.9	30	8.0	38	203	
" "	" "	" 13	1,400	6.0	11.7	93.8	1.9	93	7.9	120	176	
" "	" "	" 19	4,800	9.5	10.5	91.4	2.6	460	7.7	260	142	
" "	" "	" 25	1,100	14.0	9.6	92.9	1.0	9	8.0	35	229	
" "	" "	May 5	500	14.0	10.6	101.8	1.1	3	8.0	17	237	
" "	" "	" 11	400	17.5	8.8	91.2	1.3	2	7.6	8	157	
" "	" "	" 15	300	15.5	8.8	87.1	0.9	2	8.1	5	231	
" "	" "	" 23	300	22.0	7.9	89.2	2.7	4	7.7	450	82	
" "	" "	" 29	270	23.5	7.2	84.1	2.3	46	8.1	59	214	
" "	" "	June 8	120	24.5	7.4	87.8	1.4	24	8.4	117	179	
" "	" "	" 14	2,365	17.0	6.7	68.9	4.7	1,100	8.5	775	52	
" "	" "	" 22	3,760	24.0	6.6	77.0	3.6	2,100	7.7	950	66	
" "	" "	" 30	7,360	23.0	7.0	80.3	2.7	930				
" "	" "	July 18	118	23.0	8.0	92.2	1.8	150				
" "	" "	" 31	210	22.5	7.5	86.1	1.4	93				
" "	" "	Aug. 15	165	26.5	7.1	87.2	1.9	230				
" "	" "	1940 Jan. 18	311	0.0	Lost	**	2.7	460	7.7			
" "	" "	" 31	119	0.0	12.6	86.2	7.5	43	7.9			
" "	" "	Feb. 8	791	1.0	13.4	93.9	7.1	210	7.5			
" "	" "	" 16	564	1.0	13.9	97.5	1.9	23	7.9			
" "	" "	" 23	739	1.5	13.5	96.4	1.1	93	7.8			
" "	" "	" 29	1,190	3.0	13.5	99.9	1.5	43	7.8			
" "	" "	Mar. 6	2,440	3.0	12.5	93.0	1.5	150	7.6			
" "	" "	" 12	530	3.0	12.7	94.4	1.1	9	7.9			
" "	" "	" 18	505	10.0	11.7	103.4 *	0.8	2	8.0			
" "	" "	" 26	306	6.0	13.5	108.1	0.9	2	8.2			
" "	" "	Apr. 3	600	16.0	10.0	101.0	1.5	4	8.1			
Little Miami River, below Milford, O.	Lm 13.3	1939 Aug. 28	226	23.5	9.0	104.3	2.0	23	8.2			
" "	" "	Sept. 25	115	20.0	8.0	87.0	3.1	46	8.0			
" "	" "	Oct. 23	123	12.5	10.2	94.8	2.2	23	8.1			
" "	" "	Nov. 20	209	6.0	11.6	92.8	1.3	93	8.0			
" "	" "	1940 Jan. 2	171	0.0	14.8	101.1	0.7	7	8.0			
Turtle Creek - above Lynchburg, Ohio	LaEFT 81	1939 Oct. 9		21.5	3.9	44.1	5.1	36	7.9			
" "	" "	Nov. 6		6.0	4.2	33.4	4.7	21	7.5			
" "	" "	Dec 15		2.5	13.5	99.0	3.4	9	7.8			
" "	" "	1940 Jan. 25		0.0	12.8	87.3	4.4	9	7.5			
E. Fk. L. Miami R. above Lynchburg, Ohio	LaEF 81	1939 Oct. 9	1	20.0	2.5	27.6	3.5	23	7.7			
" "	" "	Nov. 6	1	3.0	6.8	50.7	2.0	4	7.6			
" "	" "	Dec. 15		1.5	11.9	85.0	1.4	2	7.9			
" "	" "	1940 Jan. 25		0.0	9.2	63.1	1.1	4	7.5			
E. Fk. Little Miami R., Below Lynchburg, O.	LaEF 80	Oct. 9	1	21.0	5.6	61.8	3.2	4	7.8			
" "	" "	Nov. 6	1	5.0	10.3	80.5	1.8	240	7.8			
" "	" "	Dec. 15		1.5	10.[illegible]	77.0	1.6	93	7.8			

TABLE Lm-7 LITTLE MIAMI RIVER BASIN

OHIO RIVER POLLUTION SURVEY
LABORATORY DATA

SUMMARY OF INDIVIDUAL RESULTS

Sampling Point	Mileage From Mouth	Date 1940	Average Discharge c.f.s.	Temp. °C	Dissolved Oxygen p.p.m.	Dissolved Oxygen % Sat.	5 Day B.O.D. p.p.m.	Coliform M.P.N. Per ml	pH	Turbidity p.p.m.	Alkalinity p.p.m.	Hardness p.p.m.
E. Fk. Little Miami R., below Lynchburg, Ohio	LaEf 80	Jan. 25		0.0	10.0	68.7	0.9	46	7.6			
E. Fk. Little Miami R., above Williamsburg, O.	LaEf 46.2	1939 June 21		25.0	6.6	78.4	2.1	23				
" "	" "	" 30		25.0	7.0	83.5	0.7	36				
" "	" "	July 16		2[illegible].5	6.6	78.1	2.6	93				
" "	" "	July 31		24.0	7.1	83.7	1.2	15				
" "	" "	Aug. 15		26.0	6.2	75.2	2.4	24				
" "	" "	" 29		22.5	6.5	74.5	2.1	5	7.5			
" "	" "	Sept. 26		19.0	8.0	85.9	3.4	29	7.7			
" "	" "	Oct. 24		11.5	8.8	80.2	[illegible]	2	7.6			
" "	" "	Nov. 21		6.5	10.4	84.[illegible]	[illegible].5	2	7.6			
" "	" "	1940 Jan. 3		0.0	12.8	87.5	1.6	2	7.9			
E. Fk. Little Miami R., below Williamsburg, O.	LaEf 45.0	1939 June 21		26.5	7.1	87.0	1.[illegible]	91				
" "	" "	" 30		25.0	7.2	85.7	1.7	36				
" "	" "	July 16		20.0	6.7	76.1	5.7	1,100				
" "	" "	July 31		23.5	7.5	87.4	1.4	41				
" "	" "	Aug. 15		27.0	6.0	74.1	2.1	46				
" "	" "	" 29		22.0	6.9	78.1	1.8	240	7.6			
" "	" "	Sept. 26	1	20.0	6.2	67.2	3.9	240	7.5			
" "	" "	Oct. 24	3	12.0	8.1	75.1	4.0	23	7.5			
" "	" "	Nov. 21	7	6.0	6.5	52.1	11.0	1,100	7.4			
" "	" "	1940 Jan. 3		0.0	13.6	92.8	3.1	73	7.8			
Town Run - above Bethel, Ohio	LaEfTo 44.5	1939 Aug. 1		21.5	3.8	42.3	[illegible]	93				
" "	" "	Sept. 11		17.5	1.8	18.7	5.1	430				
Town Run - below Bethel, O.	LaEfTo 43	Aug. 1		22.0	3.7	42.2	3.7	1,100				
" "	" "	Sept. 11		17.5	0.0	00.0	42.6	15,000				
E. Fk. Little Miami R., above Batavia, O.	LaEf 25	June 21		27.0	7.5	93.2	1.6	75				
" "	" "	" 30		24.0	7.3	85.6	[illegible].0	91				
" "	" "	July 16		23.5	7.4	86.0	2.5	1,100				
" "	" "	" 31		23.5	8.3	96.5	1.5	36				
" "	" "	Aug. 15		26.5	7.2	[illegible].1	1.7	110				
" "	" "	" 29		21.5	7.7	86.4	1.5	110	7.9			
" "	" "	Sept. 26		19.0	6.2	66.3	2.5	64	7.7			
" "	" "	Oct. 24		11.5	5.2	47.2	7.2	2,400	7.5			
" "	" "	Nov. 21		6.0	10.4	83.1	4.5	4,600	7.6			
" "	" "	1940 Jan. 3		0.0	15.0	102.3	1.3	36	7.9			
E. Fk. Little Miami R., below Batavia, Ohio	LaEf 24.2	1939 July 16		23.5	5.8	67.8	3.0	2,400				
" "	" "	" 31		23.5	7.0	81.6	1.4	430				
" "	" "	Aug. 15		28.5	4.5	54.5	1.8	460				
" "	" "	" 29		23.0	7.6	87.7	2.[illegible]	39	7.6			
" "	" "	Sept. 26	2	19.0	4.4	47.8	3.8	9	7.5			
" "	" "	Oct. 24	4	11.0	8.4	76.0	8.3	4	7.9			
" "	" "	Nov. 21	10	6.5	4.9	40.0	3.4	46	7.5			
" "	" "	Jan. 3		0.0	13.4	91.5	5.1	240	7.8			

TABLE La-7 LITTLE MIAMI RIVER BASIN

OHIO RIVER POLLUTION SURVEY
LABORATORY DATA

SUMMARY OF INDIVIDUAL RESULTS

Sampling Point	Mileage From Mouth	Date 1939	Average Discharge c.f.s.	Temp. °C	Dissolved Oxygen p.p.m.	Dissolved Oxygen % Sat.	5 Day B.O.D. p.p.m.	Coliform M.P.N. Per ml.	pH	Turbidity p.p.m.	Alkalinity p.p.m.	Hardness p.p.m.
E. Fk. Little Miami R. below Batavia, Ohio	LaEf 20	June 21		27.0	7.2	88.7	1.6	36				
" "	" "	" 30		24.0	6.8	79.7	2.1	430				
E. Fk. Little Miami R. at mouth	LaEf 12.7	May 11		18.0	8.4	88.6	2.1	9				
" "	" "	" 15		16.5	8.6	87.7	2.2	4				
" "	" "	" 23		21.0	5.9	65.6	2.3	240				
" "	" "	" 29		24.5	7.7	91.6	3.6	30				
" "	" "	June 6		24.5	5.9	69.5	2.7	110				
" "	" "	" 14		19.0	6.5	69.7	2.1	43				
" "	" "	" 21		24.5	6.7	78.9	1.8	240				
" "	" "	" 30		22.5	6.6	75.7	3.2	930				
" "	" "	July 18		23.5	7.3	84.5	1.8	73				
" "	" "	" 31		23.0	6.2	71.5	1.8	43				
" "	" "	Aug. 15		26.5	6.8	83.3	2.8	36				
" "	" "	" 29		22.5	5.6	64.3	2.4	46	7.6			
" "	" "	Sept. 26	2	20.0	8.7	94.7	2.0	24	7.7			
" "	" "	Oct. 24	6	13.0	7.8	73.6	2.7	2	7.7			
" "	" "	Nov. 21	14	7.5	11.2	93.5	2.2	2	7.6			
" "	" "	1940 Jan. 3		0.0	13.1	89.3	3.2	8	7.8			
" "	" "	Jan. 18		0.0	Lost	--	4.2	93	7.7			
" "	" "	" 24		0.0	11.3	77.3	2.3	36	7.5			
" "	" "	" 30		0.0	10.1	69.2	3.1	2	7.7			
" "	" "	Feb. 8		0.0	13.0	89.0	7.4	230	7.5			
" "	" "	" 16		0.0	13.4	91.5	4.4	93	7.5			
" "	" "	" 23		2.0	13.2	95.5	2.6	20	7.5			
" "	" "	" 29		3.5	13.3	99.9	3.1	43	7.5			
" "	" "	Mar. 6		3.5	11.5	85.7	2.4	43	7.4			
" "	" "	" 12		3.0	11.7	86.8	1.4	11	7.8			
" "	" "	" 18		10.0	10.8	95.0	0.9	24	7.7			
" "	" "	" 26		7.0	11.9	97.6	0.9	1	7.6			
" "	" "	Apr. 3		15.5	9.0	89.9	1.7	24	7.7			
Little Miami R. Plainville Bridge	La 8.3	1939 Jan.			14.4		1.8		8.2	25	230	
Little Miami River Clare Bridge	La 7.5	Jan.			13.1		1.6		8.1	36	155	
Little Miami River, Beechmont Bridge	La 4.3	Jan. 12			12.4		5.1		8.2	25	123	
" "	" "	" 13			12.6		4.7		8.0	25	216	
" "	" "	" 16			12.8		2.8		8.3	25		
" "	" "	" 17			12.8		2.4		8.3	25	197	
" "	" "	" 18			12.8		2.2		8.2	25		
" "	" "	" 19			12.8		2.6		8.1	36	142	
" "	" "	" 20			13.0		1.5		8.1	25	146	
" "	" "	" 23			13.2		1.9		8.0	96	140	
" "	" "	Feb. 23	,500	[illegible]	Broken	--	2.2	240				
" "	" "	" 28	13500	5.0	12.5	97.5	1.9	240				
" "	" "	Mar. 8	1,620	5.5	12.0	94.7	1.6	43				
" "	" "	" 16	2,350	6.0	10.5	83.8	0.8	39				
" "	" "	" 24	588	9.5	10.6	92.8	0.5	30				
" "	" "	" 28	6,910	5.5	12.0	94.5	4.8	240				
" "	" "	Apr. 3	1,610	7.0	11.0	90.6	1.3	230				
" "	" "	" 13	2,060	5.5	11.3	89.6	2.4	240				

TABLE Ln-7 LITTLE MIAMI RIVER BASIN

OHIO RIVER POLLUTION SURVEY
LABORATORY DATA

SUMMARY OF INDIVIDUAL RESULTS

Sampling Point	Mileage From Mo. th	Date 1939	Average Discharge c.f.s.	Temp. °C	Dissolved Oxygen p.p.m.	Dissolved Oxygen % Sat.	5 Day B.O.D. p.p.m.	Coliforms M.P.N. Per ml	pH	Turbidity p.p.m.	Alkalinity p.p.m.	Hardness p.p.m.
Little Miami River [illegible]chmont bridge	Lm 4.3	Apr. 19	7,050	10.0	9.5	84.2	2.0	460				
" "	" "	" 25	1,610	14.5	8.6	85.8	1.3	460				
" "	" "	May 5	734	13.5	10.2	97.2	2.0	91				
" "	" "	" 11	587	18.0	7.5	78.4	2.8	430				
" "	" "	" 15	441	16.0	7.8	78.0	2.4	2,400				
" "	" "	" 23	441	21.5	6.5	73.0	4.2	930				
" "	" "	" 29	397	23.0	6.1	70.5	3.1	750				
" "	" "	June 8	176	24.0	5.6	65.7	3.4	4,600				
" "	" "	" 14	3,470	17.5	7.2	74.8	5.9	2,400				
" "	" "	" 22	5,520	24.5	5.4	64.1	3.6	930				
" "	" "	" 30	10,800	23.0	6.8	76.7	None	2,400				
" "	" "	July 18	174	21.0	4.5	50.4	13.1	4,600				
" "	" "	" 31	308	22.5	6.9	78.9	2.1	4,600				
" "	" "	Aug. 15	228	25.5	3.8	46.4	4.0	4,300	7.7			
" "	" "	" 28	154	23.5	7.7	90.0	4.6	2,300	7.8			
" "	" "	Sept. 11	87	20.0	3.0	33.2	10.6	430				
" "	" "	Sept. 25	78	19.5	1.5	16.5	1.6	4,600	7.5			
" "	" "	Oct. 9	79	19.5	2.5	27.0	7.8	11,000	7.7			
" "	" "	" 23	84	11.5	4.0	37.0	8.0	2,300	7.5			
" "	" "	Nov. 6	134	6.0	9.1	73.1	9.4	4,300	7.6			
" "	" "	" 20	142	6.0	6.7	56.3	13.6	4,600	7.6			
" "	" "	Dec. 15	167	3.5	12.0	90.0	7.5	1,100	7.9			
" "	" "	1940 Jan. 2	120	0.0	12.5	85.5	5.6	2,100	7.7			
" "	" "	" 18	456	0.0	Lost	--	3.5	2,400	7.7	170		
" "	" "	" 24	308	0.0	12.6	86.0	5.0	2,400	7.6			
" "	" "	" 31	175	0.0	11.8	80.8	5.1	4,600	7.9			
" "	" "	Feb. 8	1,160	3.0	13.0	96.7	8.1	930	7.6			
" "	" "	" 16	828	1.0	13.7	96.3	1.5	36	7.9			
" "	" "	" 23	1,085	2.0	Lost	—	—	460				
" "	" "	" 29	1,750	2.0	13.3	96.0	1.3	150	7.8			
" "	" "	Mar. 6	3,580	3.5	12.0	90.2	2.5	93	7.5			
" "	" "	" 12	779	4.0	12.1	92.2	3.2	1,100	7.5			
" "	" "	Mar. 18	742	9.0	11.6	100.3	0.9	9	7.8			
" "	" "	" 26	449	7.0	12.2	100.6	1.6	93	8.0			
" "	" "	Apr. 3	881	15.0	9.8	96.6	1.5	93	8.1			
" "	" "	" 23		8.0	--	--	2.5	93	7.5	320	85	
" "	" "	" 24		8.0			1.9	460	7.6	270	84	
" "	" "	" 25		10.0			—	93	7.8	140	109	
" "	" "	" 26		10.0			1.5	75	7.7	100	22	
" "	" "	" 29		13.5			1.2	75	7.7		197	
" "	" "	" 30		13.5			1.8	1,100	7.8	35	212	
" "	" "	May 1		15.0			2.4	240	7.8	160	220	
" "	" "	" 2		11.0			2.6	240	7.8	160	227	
" "	" "	" 3		10.0			2.2	460	7.8	65	230	
" "	" "	" 6					1.9		7.8	15	228	
** Less than one												

KENTUCKY RIVER BASIN

Final Report to the Ohio River Committee

Ohio River Pollution Survey

U. S. Public Health Service
Cincinnati, Ohio
1942

KENTUCKY RIVER BASIN

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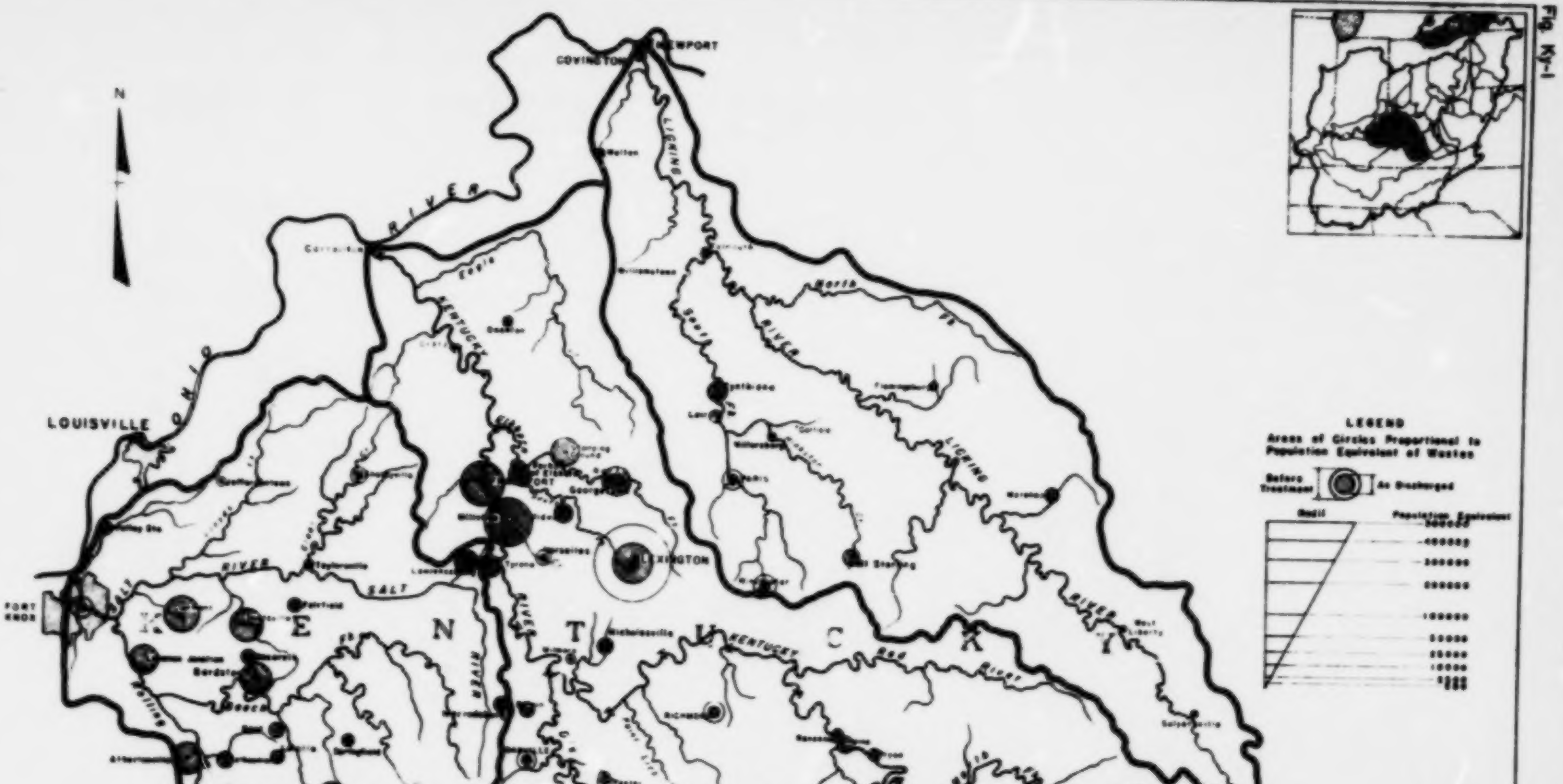

Fig. Ky-1
N
COVINGTON
NEWPORT
LOUISVILLE
FORT KNOX
LEXINGTON
OHIO
RIVER
LICKING
KENTUCKY
SALT
RIVER
Red River
K E N T U C K Y
LEGEND
Areas of Circles Proportional to Population Equivalent of Wastes
Before Treatment
As Discharged
Radii
Population Equivalent
500000
400000
300000
200000
100000
50000
10000
SCALE OF MILES
10
0
10
20

Fig. Ky-1

KENTUCKY-LICKING-SALT BASINS

SOURCES OF POLLUTION

OHIO RIVER POLLUTION SURVEY
U S PUBLIC HEALTH SERVICE
1941

KENTUCKY RIVER BASIN

Syllabus and Conclusions

Syllabus

The Kentucky River Basin (drainage area 6,940 square miles) comprises parts of the mountains of eastern Kentucky and of the Bluegrass area in the central part of the state. Agriculture and coal mining are the principal industries and the area is predominantly rural. Of the total population of 480,000, only 20 percent is urban. The pollution problems are primarily of local interest and much has been done already toward pollution abatement. About two-thirds of the population of 105,000 served by sewers are connected to treatment plants. The principal waste producing industry, whiskey distilling, accounts for almost 90 percent of the industrial waste load discharged to the streams. All of the distilleries have adopted corrective measures of one kind or another to reduce pollution. Acid mine drainage damages a number of the creeks in the mountainous area but none of the large streams are acid. Abatement of pollution can be effected by known methods of treatment.

Conclusions

(1) Although 10 public water supplies are taken from streams below sources of pollution, at only one of them, Irvine, is pollution serious. Correction of this situation will probably require changes in the water system in addition to waste treatment.

(2) A total of 105,000 people are connected to sewers, of which about 65 percent are tributary to treatment plants. Industrial wastes, chiefly from distilleries, have a sewered population equivalent of about 130,000, of which about one-third is connected to municipal treatment.

(3) The laboratory observations indicate that, except below Irvine and Frankfort, the main Kentucky River is not seriously polluted. Gross pollution followed by rapid recovery is indicated below communities on tributaries. Distilleries were not all in operation at the time of sampling. Acid mine drainage was encountered on certain headwater streams.

(4) Minimum monthly flows of 91.3 and 15.8 c.f.s. were experienced in 1930 on the main Kentucky River at Frankfort and near Winchester respectively. Eliminating 1930, the low flows are 350 and 55 c.f.s. respectively.

(5) Proposed flood-control reservoir sites studied by the U. S. Engineer Department are so located as to be of little tangible benefit to pollution control.

(6) Most of the sources of pollution are on tributary streams which are subject to extremely low flows. Secondary treatment of wastes is necessary at these places and has already been installed at many of them. In general, primary treatment will be adequate on the main river.

(7) The principal sources of industrial wastes are the whiskey distilleries. Most of these operate only during the winter months when temperatures are low and stream flows high. Those which operate throughout the year cause the most serious pollution. Rather complete treatment is needed at these plants.

(8) A summary of cost estimates of remedial measures from Table Ky-1 follows:

Treatment	Capital Cost	Annual Cost
Existing	$1,370,000	$155,000
Suggested Additional	1,490,000	160,000

Estimated additional costs, over existing charges, of programs involving uniform treatment throughout the basin, are:

Primary, all places	1,300,000	135,000
Secondary, all places	1,600,000	170,000

Table Ky-1 Kentucky River Basin - Estimated Cost of Existing and Suggested Minimum Corrective Measures for Municipal and Industrial Wastes, with Comparative Costs for Primary and Secondary Treatment.

	Number of Plants		Population Connected to Sewers	Capital Investment (Dollars)	Annual Charges (Dollars)		
	Prim.	Sec.			Amort. & Interest	Operation & Main.	Total
Existing Sewage Treatment	3	10	69,400	1,370,000	95,000	60,000	155,000
Suggested Minimum Correction							
Sewage Treatment Plants	3	7	35,700	670,000	45,000	30,000	75,000
Required Interceptors			-	460,000	25,000	-	25,000
Independent Industrial Waste Correction	-		-	360,000	55,000	5,000	60,000
Total				1,490,000	125,000	35,000	160,000
Comparative Cost							
Primary Treatment all Waste				1,300,000	110,000	25,000	135,000
Secondary Treatment all Waste				1,600,000	130,000	40,000	170,000
As Suggested				1,490,000	125,000	35,000	160,000

Description

The Kentucky River, the largest stream lying wholly within the State of Kentucky, rises in the mountains near the Virginia border, flows in a general northwesterly direction across the state and enters the Ohio River at Carrollton, Kentucky. It drains an area of approximately 6,940 square miles.

Major Tributaries	Distance above Mouth	Drainage Area (sq. miles)
Eagle Creek	11.0	500
Elkhorn Creek	52.2	440
Dix River	118.1	460
Red River	190.3	480
South Fork	254.8	736
Middle Fork	258.6	545
North Fork	258.6	1,305

	Populations			
Larger Cities	1910	1920	1930	1940
Lexington	35,099	41,534	45,736	49,304
Frankfort	10,465	9,805	11,626	11,492
Hazard	537	4,348	7,021	7,397
Richmond	5,340	5,622	6,495	7,335
Danville	5,420	5,099	6,729	6,734
Entire Basin				
Rural	293,650	317,234	341,608	385,916
Urban	63,792	75,802	88,604	96,053
Total	357,442	393,036	430,212	481,969

The upper half of the basin is mountainous and covered with second growth timber. Coal is mined extensively along the North Fork. Much of this mountain section is isolated and sparsely settled. Hazard is the only urban community in this area.

In contrast, the lower half of the basin includes a large part of the famous Bluegrass section of Kentucky, a very fertile agricultural area. The primary crops are tobacco, corn and livestock. The distilling industry is important.

Water Uses - Although the main stream has been canalized for 260 miles by the construction of 14 locks and dams, the navigation facilities are relatively little used. The hydroelectric development on Dix River near its mouth is the only one of any size in the Kentucky Basin. The storage reservoir, known as "Lake Herrington," provides Danville with a dependable source of water supply and is widely used for boating and fishing. The Kentucky River and many of its tributaries are used extensively for swimming, boating and fishing.

Presentation of Field Data

Figure Ky-1 shows the location and magnitude of each source of pollution of consequence in the basin. Figure Ky-2 shows similar data and, in addition, the location of water supply intakes from streams below sources of pollution and laboratory data on coliform organisms, dissolved oxygen and B.O.D.

Public Water Supplies - Of the 38 public water supplies in the basin, 19 are from underground sources and 19 are wholly or in part from surface sources. The 19 underground supplies serve only about 18,200 people whereas the surface supplies serve 132,800 people. Underground water is generally available in very limited quantities and the chemical quality is usually poor although in the Bluegrass section there are a number of springs which yield moderately large quantities of water of satisfactory chemical quality. Table Ky-2 shows data on the surface supplies of the basin. In addition to these supplies, Winchester, Ky., in the Licking Basin, maintains an emergency intake in the Kentucky River.

Sewerage - Table Ky-3 shows the sewered population at each of the more important sources of pollution in the basin. Of the 105,300 people connected to sewers, about two-thirds are connected to sewage treatment plants. Ten secondary treatment plants serve 68,200 people while the three primary treatment plants serve 1,200 people.

Industrial Wastes - Of the 23 industrial plants which are not connected to municipal treatment plants, 9 distilleries account for almost 90 percent of the total waste load. Table Ky-4 shows data on industrial waste producing plants. All but 500 of the 32,900 population equivalent discharged to municipal treatment plants is at Lexington.

All of the distilleries have taken steps of one sort or another to reduce the pollutional significance of their wastes. The measures range from cattle-feeding, ponding and broad irrigation to evaporation of the distillery slop. The fact that most of the companies operate only during the winter months when temperatures are low and stream flows usually high helps to reduce the seriousness of pollution from these sources.

Table Ky-2 Kentucky River Basin - Surface Water Supplies

Municipality	Source	Mile (1)	Treat-ment (2)	Popu-lation Served	Con-sumption M.G.D.
Supplies below Community Sewer Outfalls					
Frankfort	Kentucky River	67.5	FD	12,700	1.51
Versailles	Spring-Well-Kentucky R.(3)	89	FD	2,200	0.15
Lexington	Impounded-Kentucky R.(3)	167	FD	66,500	5.60
Irvine	Kentucky River	218.6	CD	3,800	0.17
Pryse	" "	226.8	CD	100	0.01
Beattyville	" "	255	FD	600	0.02
Jackson	N.Fk.Kentucky R.	305.5	FD	1,000	0.05
Hazard	" " " "	361	FD	16,000	0.80
Stamping Ground	N.Fk.Elkhorn Cr. Spring	86	FD	400	0.01
Danville	Dix River	149	FD	10,000	0.60
Other Surface Supplies					
Sadieville	Eagle Creek	67.5	FD	400	0.01
Midway	Lees Branch-Well	87	FD	600	0.02
Manchester	Goose Creek	311	FD	1,000	0.03
Owenton	Impounded	-	FD	800	0.05
Eminence	"	-	FD	1,400	0.05
Lancaster	" -Spring	-	FD	1,700	0.06
Stanford	" "	-	FD	1,300	0.06
Berea	" "	-	D	3,700	0.27
Richmond	"	-	FD	8,600	0.80
Total - Below Sewer Outfalls				113,300	8.92
Other				19,500	1.35
Total - Surface Water Supplies				132,800	10.27

(1) Miles above mouth of Kentucky River.
(2) F - Coagulated, settled, filtered, D - Chlorinated, C - Coagulated, settled.
(3) Emergency intakes in Kentucky River.

Table Ky-3 Kentucky River Basin - Sources of Pollution, Including Industrial Wastes, Expressed as Sewered Population Equivalent (B.O.D.)

Municipality	Stream	Miles Above Mouth of Kentucky R.	Population Connected to Sewers	Treatment	Sewered Population Equivalent (B.O.D.)	
					Untreated	Discharged
Frankfort	Kentucky River	66	13,500	None	30,600	30,600
Tyrone	" "	84	-	-	4,700	4,700
Irvine	" "	218	3,300	None	3,300	3,300
Pryse	" "	227	100	"	1,800	1,800
Jackson	No. Fork Kentucky River	305	1,300	"	1,300	1,300
Hazard	" " " "	360	6,700	"	6,700	6,700
Whitesburg	" " " "	404	1,700	"	1,700	1,700
Owenton (1)	Stephens Creek	47	800	Primary	1,000	700
Forks of Elkhorn	Elkhorn Creek	70	-	-	4,900	4,900
Stamping Ground	Locust Fork	86	-	-	11,500	11,500
Georgetown	North Elkhorn Creek	104	4,800	None	10,300	10,300
Midway (1)	Lees Br.-So.Elkhorn Cr.	87	600	Secondary	4,200	3,700
Lexington	Town Br.of S.Elkhorn Cr.	113	46,200	"	90,600	23,800
Millville	Glenns Creek	72	-	None	30,300	30,300
Versailles	" "	84	2,100	Secondary	2,100	300
Lawrenceburg	Bailey's Run	87	-	-	2,900	2,900
Burgin	Dowling Branch	128	-	-	2,500	2,500
Danville (1)	Clarks Run	155	5,100	Secondary	5,300	1,000
Lancaster	Dix River Trib.	166	1,300	"	1,300	200
Stanford (1)	St. Asaph Creek	175	1,200	"	1,500	200
Nicholasville (1)	Town Br.of Jessamine Cr.	141	2,000	"	2,900	1,200
Berea (1)	Brush Fk. of Silver Cr.	139	3,300	"	3,400	500
Richmond	Dreaming Creek	190	5,700	"	6,300	1,400
McRoberts	Wrights Fork	423	2,000	None	2,000	2,000
7 Smaller sources			3,600	Various	3,600	2,900
Total	-	-	105,300	-	236,700	150,400

(1) Treatment plant under construction at time of laboratory survey.

Table Ky-4 Kentucky River Basin - Summary of Industrial Wastes not Discharging to Municipal Treatment Plants, with Total of Entire Industrial Waste Load in the Basin.

Industry	Number of Plants	Industrial Waste Disposal		At Least Minor Corrective Measures Taken	Estimated Sewered Population Equivalent (B.O.D.)
		Munic. Sewers	Private Outlets		
Canning	3	2	1	2	6,300
Distilling	9	0	9	9	86,200
Meat	6	1	5	2	1,100
Milk	3	1	2	1	1,000
Miscellaneous	2	0	2	1	3,900
Waste Unconnected Munic. Treatment	23	4	19	15	98,500
Waste Connected to Municipal Treatment					32,900
Total Industrial Waste in Basin					131,400

Acid mine drainage causes problems of primarily local importance in the area drained by the North Fork. Records compiled while the mine sealing program was active in Kentucky indicate 177 active, 62 marginal and 416 abandoned coal mines in seven counties. One hundred and thirty-seven abandoned mines have been sealed. Mine sealing records indicate that water containing a total of 60 tons of mine acid daily flows into tributary streams in this mining area. Some progress has been made in reducing acid mine drainage through sealing 137 abandoned coal mines. The relatively high natural alkalinity of the natural run-off helps to reduce the damage by mine drainage.

Presentation of Laboratory Data

The laboratory observations for the Kentucky River Basin are summarized in Table Ky-7. Selected data on the main stream and tributaries are in Table Ky-5. Except for the observations at Gratz and Carrollton, all of the results were obtained by a mobile laboratory unit operating in the basin during September, October and November 1939, and are representative of the low-flow conditions which prevailed in the basin at that time. The Gratz and Carrollton samples were collected over a period of several months.

Figures Ky-3, Ky-4 and Ky-5 show by means of symbols the results of the coliform, dissolved oxygen and oxygen demand determinations at the various sampling points in the basin. In each case the results shown for Gratz and Carrollton represent the most unfavorable monthly averages of the observations at these points made over the several month sampling period. At all other points the results represent the averages of from one to three samples collected over short periods of less than one month by the mobile laboratory unit. The full effects of distillery wastes on the streams in this basin were not observed at the time of this survey as not all of the plants were in operation.

The results of these laboratory observations indicate that except for two stretches below Irvine and Frankfort the main Kentucky River is not seriously polluted. Gross pollution, however, seems to be the rule below most of the communities investigated along the tributaries. The coliform observations, in general, corroborate the dissolved oxygen and oxygen demand results except on the North Fork above Hazard where the coliforms tend to show the worst conditions. A tendency towards fairly rapid recovery below the zones of pollution is indicated by well marked coliform and oxygen demand reductions and by dissolved oxygen recoveries.

Acid mine wastes were encountered in the area above Hazard. Irishman Creek, Millstone Creek, Thornton Creek and Yellow Creek were found to be acid, with pH values ranging from 2.8 to 4.9 and phenolphthalein acidities from 18 to over 900 p.p.m.

Biological Summary - The flora and fauna of the Kentucky River are low; less than 2,000 p.p.m. except when a "bloom" of Pandorina appeared at Carrollton. The low plankton volume is indication of a clean stream. "Good fishing" is reported from Carrollton to Gratz.

Table Ky-5 Kentucky River Basin - Selected Laboratory Data

River Location	Kentucky above Beattyville	Kentucky below Beattyville	Kentucky below Irvine	Kentucky above Frankfort	Kentucky below Frankfort	Kentucky at Gratz	Kentucky Mouth Carrollton
River Miles Above: Mouth of Kentucky	255	254.3	216.5	67	62	29	0.2
Period - 1939	9-29&10-3	9-29	10-3	9-27&10-5	9-27&10-5	June 1-15	Aug. 4-24
Number of Samples	2	1	1	2	2	3	4
Flow in c.f.s.: Sampling Days	148	148	206	443	443	2,500	2,875
Minimum Month	9	9	15	91	91	-	-
Water Temperature °C.	22.5	24.5	21.5	22.0	22.0	24.0	25.9
Coliforms per ml.	125	9	2,400	23	167	19	25
Dissolved oxygen ppm.	6.9	6.7	5.8	7.7	3.8	7.7	6.3
B.O.D.,5-day, p.p.m.	1.8	2.2	1.6	1.9	2.2	1.5	1.6

River Location	North Fork above Hazard	North Fork below Hazard	Walnut Meadow Br. bel.Berea	Clark R. below Danville	Town Br. below Lexington	N. Fork Elkhorn above Georgetown	N. Fork Elkhorn below Georgetown
River Miles Above: Conf. with Kentucky	105	104	42	36	61	40	38
Mouth of Kentucky	560.5	359.5	188.5	154	113	92	90
Period - 1939	Oct.	Oct. 26	9-29 to 10-10	9-28 to 10-9	9-25 to 10-10	10-26 & 10-5	Oct. 13
Number of Samples	3	1	3	3	3	2	1
Flow in c.f.s.: Sampling Days	3.0	4.9	-	-	-	-	-
Water Temperature °C	18.7	23.5	20	20.9	21.8	18.5	14.0
Coliforms per ml.	110	110000	36,800	60,000	4,500	25	24,000
Dissolved oxygen ppm.	9.1	0.0	0.6	0.4	4.3	7.2	0.0
B.O.D., 5-day,p.p.m.	2.6	106.2	85.2	24.0	11.4	1.7	28.5

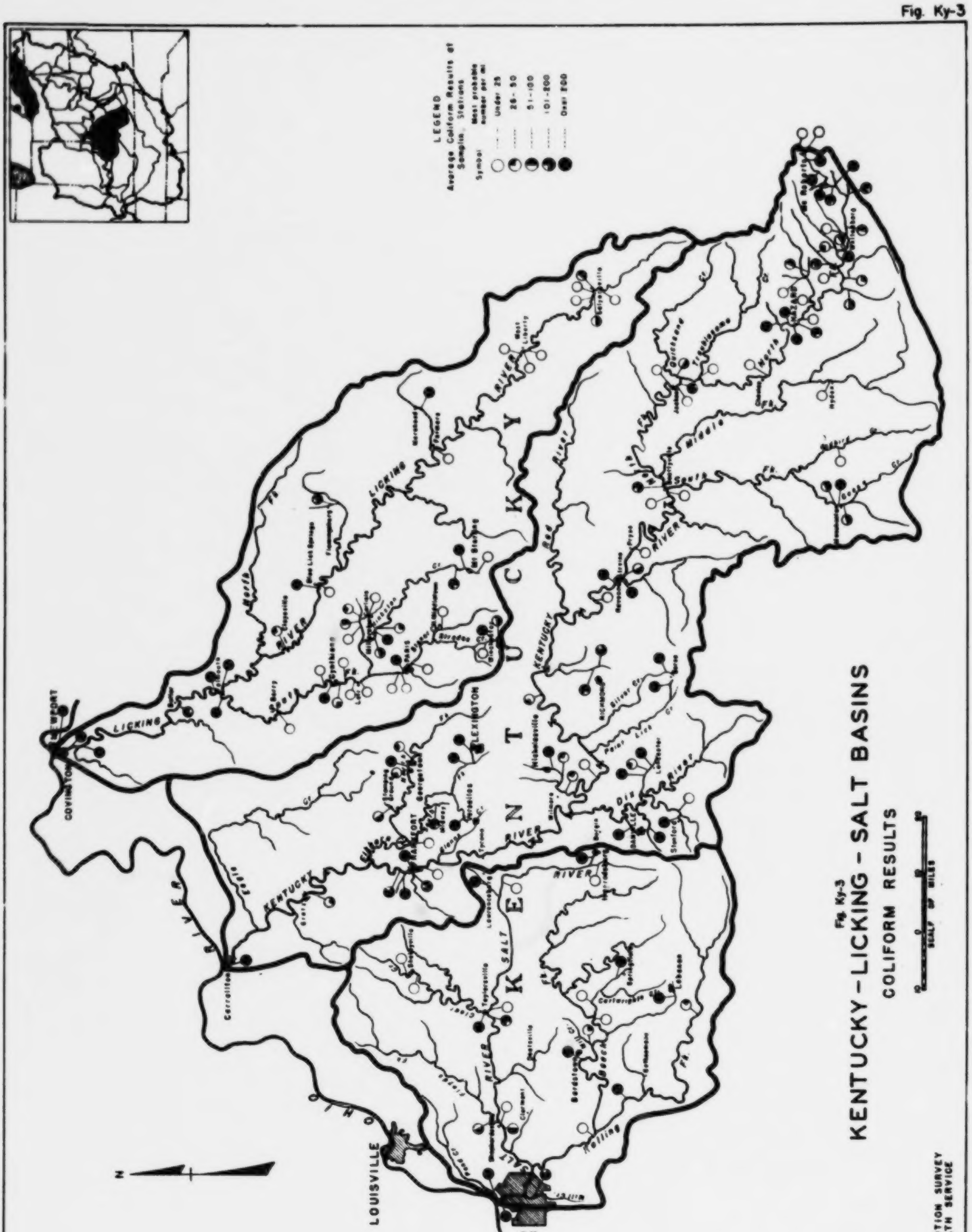
LEGEND
Average Coliform Results at Sampling Stations
Symbol
Most probable number per ml
○ Under 25
26-50
51-100
101-200
● Over 200
LOUISVILLE
FORT KNOX
COVINGTON
NEWPORT
Carrollton
OHIO
RIVER
LICKING
RIVER
KENTUCKY
SALT
LEXINGTON
FRANKFORT
K E N T U C K Y
SCALE OF MILES
N

Fig. Ky-3
KENTUCKY - LICKING - SALT BASINS
COLIFORM RESULTS

OHIO RIVER POLLUTION SURVEY
U. S. PUBLIC HEALTH SERVICE
1941

Fig. Ky-4

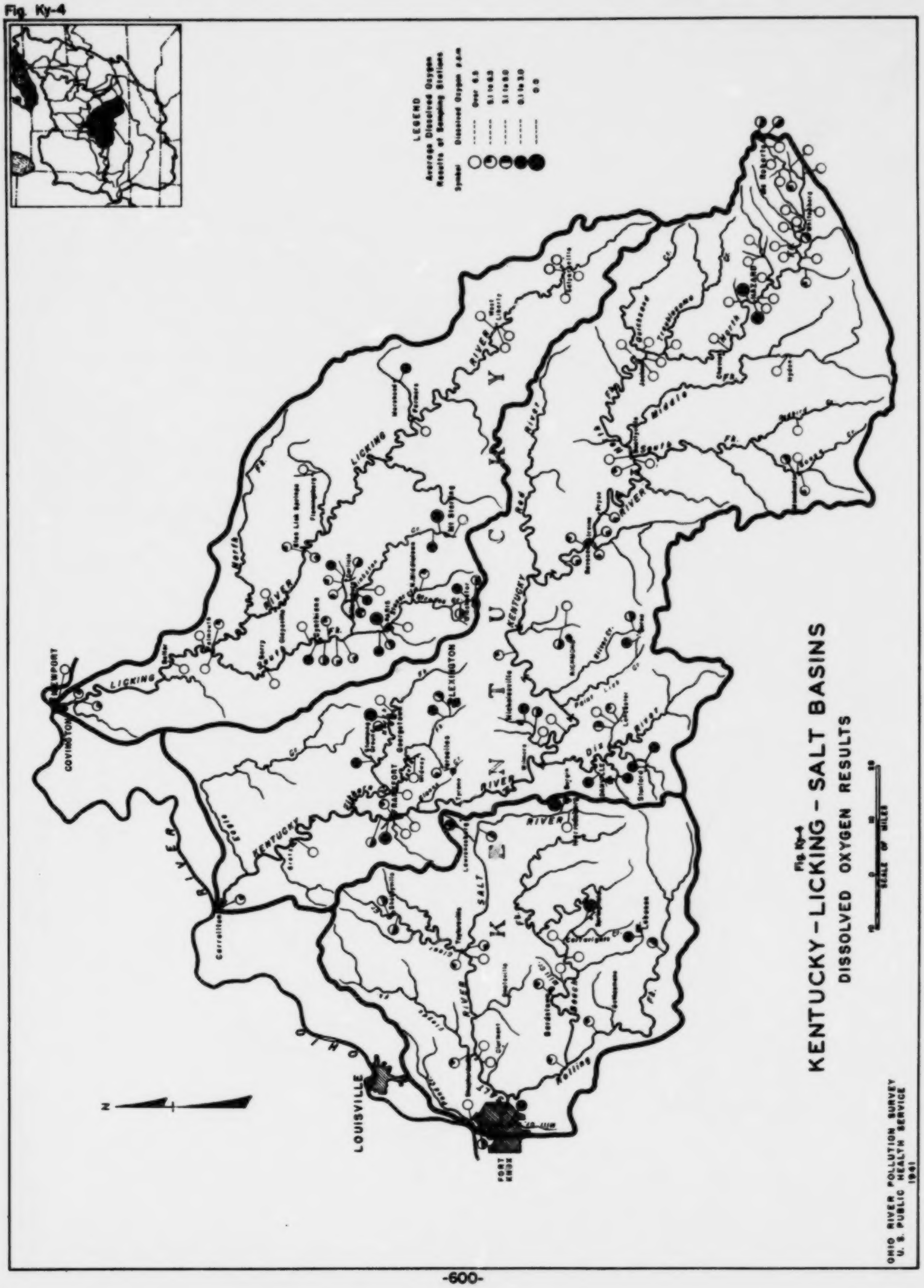
LEGEND
Average Dissolved Oxygen
Results of Sampling Stations
Symbol Dissolved Oxygen p.p.m.
○ Over 6.5
◔ 5.1 to 6.5
◒ 3.1 to 5.0
● 0.1 to 3.0
● 0.0
LOUISVILLE
FORT KNOX
OHIO
RIVER
Carrollton
COVINGTON
NEWPORT
LICKING
KENTUCKY
SALT
RIVER
FRANKFORT
LEXINGTON
KENTUCKY
Eagle
North Fk.
SCALE OF MILES
0
10
20

Fig. Ky-4
KENTUCKY - LICKING - SALT BASINS
DISSOLVED OXYGEN RESULTS

OHIO RIVER POLLUTION SURVEY
U. S. PUBLIC HEALTH SERVICE
1941

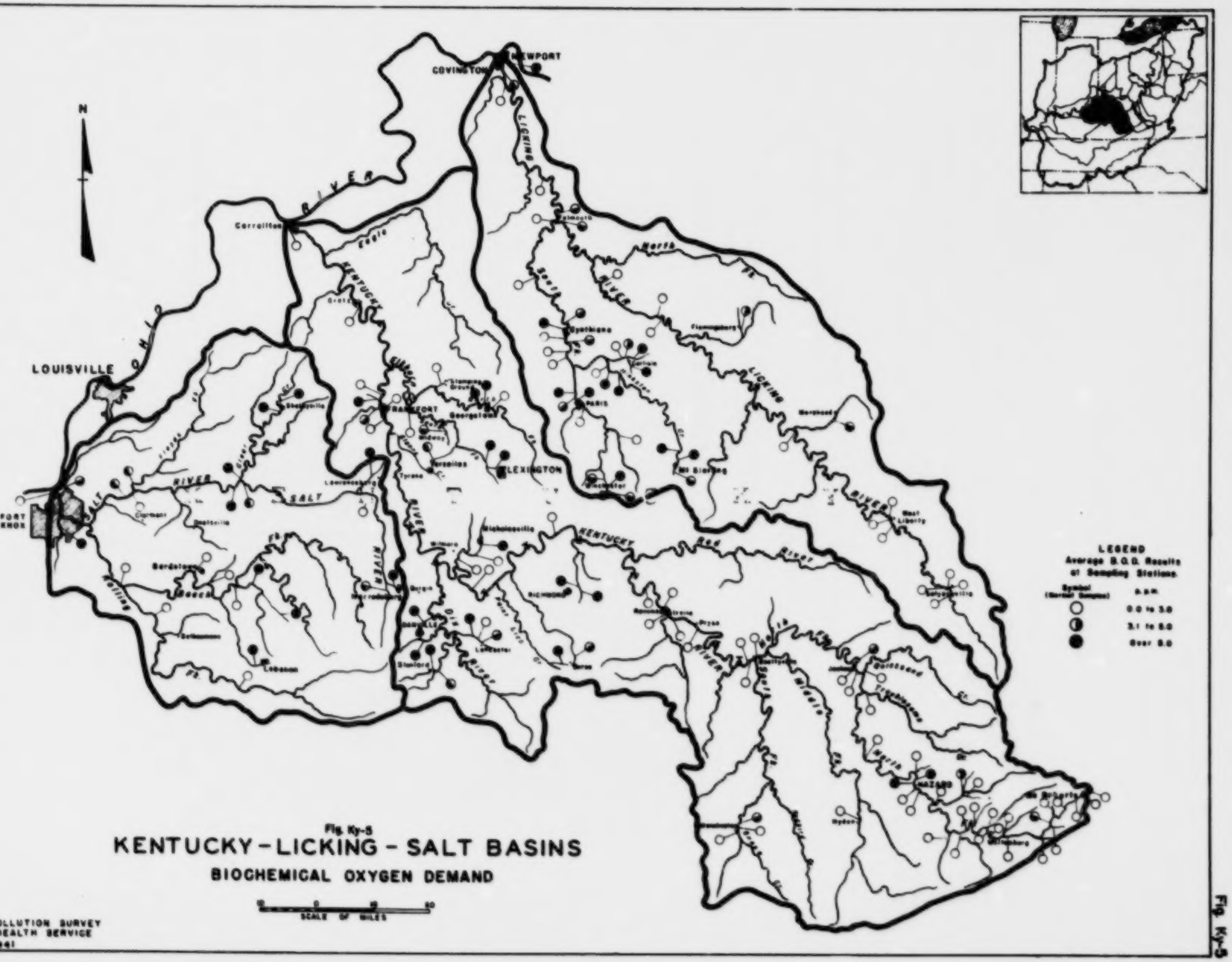
LEGEND
Average B.O.D. Results of Sampling Stations
Symbol (Serial Samples)
p.p.m.
○ 0.0 to 3.0
◐ 3.1 to 5.0
● Over 5.0
N
SCALE OF MILES
10
0
10
20
NEWPORT
COVINGTON
LOUISVILLE
FORT KNOX
Carrollton
OHIO
RIVER
LICKING
RIVER
KENTUCKY
RIVER
SALT
RIVER
Eagle
Red River
Dix River
North Fk.
South Fk.
Rolling Fk.
Beech Fk.
FRANKFORT
LEXINGTON
Georgetown
Versailles
Lawrenceburg
Nicholasville
Paris
Cynthiana
Falmouth
Flemingsburg
Winchester
Mt Sterling
Morehead
West Liberty
Salyersville
RICHMOND
Berea
Lancaster
DANVILLE
Stanford
Harrodsburg
Bardstown
Shelbyville
Lebanon
HAZARD
Hyden
Whitesburg

Fig. Ky-5

KENTUCKY - LICKING - SALT BASINS

BIOCHEMICAL OXYGEN DEMAND

OHIO RIVER POLLUTION SURVEY
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1941

Hydrometric Data

Sixteen stream gaging stations have been operated in the basin at various times, only four of which are currently in operation. These four are all on the Kentucky River. All of the tributary streams are subject to extremely low flows although discharge records are too short to indicate probable low flows with any degree of certainty. Table Ky-6 shows monthly mean flows during some of the low-flow years.

Table Ky-6 Kentucky River Basin - Monthly Mean Summer Flows for Years in Which Low Summer Flows have Occurred.

River Location	Kentucky R. at Frankfort(1)	Kentucky R. near Winchester
River Miles Above:		
Mouth of Kentucky R.	65	176
Drainage Area Sq. Mi.	5,400	3,990
Period of Record	1925-40	1909-40
Year	1930	1930
June c.f.s.	226	234
July "	121	48.8
August "	149	34.2
September "	91.3*	15.8*
Year	1936	1932
June "	544	1,060
July "	524	3,690
August "	350	1,490
September "	576	55.2
Year	1929	1936
June "	2,460	116
July "	3,890	138
August "	478	80.3
September "	1,040	246

* Minimum Month

(1) The accuracy of low-flow records at this station is poor.

Low-flow Regulation - A number of possible reservoir sites on the Kentucky River and its tributaries have been surveyed by the U. S. Engineer Department. These studies indicate that the Jessamine Reservoir on the main stream and the Booneville Reservoir on the South Fork are the most nearly satisfactory for flood control and allied development. Low-flow regulation by these reservoirs would benefit the lower 12 miles of the South Fork and the entire Kentucky River.

Such low-flow regulation would have little tangible value since it would not eliminate the need for primary treatment at the communities along the streams affected and primary treatment is considered adequate under present uncontrolled flow conditions.

Discussion

The rapidity with which the streams of the Kentucky Basin recover from the effects of pollution and the lack of intensive urban and industrial development make the pollution problems of the Kentucky Basin largely a series of local problems. Most of the worst conditions have been dealt with.

Of the cities without treatment plants, Frankfort is the largest. The Kentucky River at this point has a drainage area of 5,400 square miles, and flows of less than 100 c.f.s. have been recorded. No public water supplies are taken from the Kentucky below Frankfort, and the lower part of the river, at some distance below Frankfort, is regarded as a good fishing stream. Primary treatment of the sewage and industrial wastes (except distillery wastes) should be sufficient. More complete treatment of the distillery waste is needed. This can be effected by evaporation of the slop plus lesser improvement at small plants.

At Irvine and Ravenna the public water supply is taken from the Kentucky River below the point of entrance of Ravenna's sewage. The water is not filtered. Primary treatment of the sewage from these places should be sufficient to maintain an excellent oxygen balance in the stream. Changes in the water supply intake location or improved methods of treatment, or both, will be necessary to protect the water supply.

At Hazard, Georgetown, Whitesburg, McRoberts and Jackson, complete treatment appears justified because of the extremely low flows in the receiving streams.

The cost of these remedial measures and of other necessary pollution abatement measures is summarized in Table Ky-1.

OHIO RIVER POLLUTION SURVEY
LABORATORY DATA

SUMMARY OF INDIVIDUAL RESULTS

Sampling Point	Mileage From Mouth	Date 1939	Average Discharge c.f.s.	Temp. °C	Dissolved Oxygen p.p.m.	Dissolved Oxygen % Sat.	5 Day B.O.D. p.p.m.	Coliforms M.P.N. Per ml.	pH	Turbidity p.p.m.	Alkalinity p.p.m.	Hardness p.p.m.
Wright Fork - above water plant, McRoberts, Ky.	KyNfRW 424	Oct. 18		13.5	5.0	47.4	0.8	4	7.8	3	527	
" "	" "	" 31		12.5	5.1	47.4	0.7	36	7.8	8	540	
Wright Fork, at water plant, McRoberts, Ky.	KyNfRW 423	Oct. 25		15.0	3.5	34.5	1.2	4	8.3	4	529	
Wright Fork, above Shea Fork, McRoberts, Ky.	KyNfRW 422	Oct. 18		11.0	10.1	91.5	1.3	240	8.4	4	441	
" "	" "	" 25		14.5	9.0	87.4	0.4	1,100	8.4	3	465	260
" "	" "	" 31		10.0	9.7	85.8	1.6	240	8.3	8	453	
Wright Fork - upper edge Fleming, Ky.	KyNfRW 421	Oct. 18		9.5	10.5	91.5	1.8	240	8.4	5	484	
" "	" "	" 25		15.0	8.9	87.4	1.4	2,400	8.4	5	484	236
" "	" "	" 31		9.5	9.5	82.7	1.4	430	8.2	5	490	
Tonte Fork, above Neon, Ky.	KyNfRT 420	Oct. 18		8.0	10.4	87.6	0.5	240	7.2	4	57	
" "	" "	" 25		14.5	8.4	82.2	0.8	460	7.4	3	73	597
Boone Fork, above Potters Fork, Neon, Ky.	KyNfB 419.6	Oct. 18		12.0	8.3	76.7	3.0	240	7.9	14	269	
" "	" "	" 25		13.5	4.2	40.4	3.5	150	7.8	7	379	
Potters Fork-mouth Neon Junction, Ky.	KyNfBP 419	Oct. 18		9.0	10.7	92.3	1.3	110	8.2	9	361	
" "	" "	" 25		14.0	7.1	68.5	1.2	460	8.0	3	359	
N.Fk.Kentucky R. above Boone Fk.,Kona, Ky.	KyNf 416	Oct. 19		10.0	11.0	96.6	0.5	46	7.9	4	207	
" "	" "	" 26		16.5	8.1	82.5	1.0	240	7.8	7	196	354
N. Fk.Kentucky R. abv. Thornton Cr.,Thornton	KyNf 415	Oct. 19		10.5	10.1	89.9	0.9	46	7.9	6	256	
" "	" "	" 26		16.5	7.8	79.6	1.1	93	7.6	10	231	328
Thornton Creek, mouth Thornton, Ky.	KyNfT 414	Oct. 19		8.5	11.5	98.3	0.9	**	3.3	5	0	
" "	" "	" 26		16.0	8.1	81.3	3.9	**	3.3	6	0	
N.Fk.Kentucky R. upper edge Whitesburg, Ky.	KyNf 405	Oct. 19	**	10.0	9.8	86.8	1.0	9	7.9	5	186	
" "	" "	" 26	**	16.0	6.3	63.0	1.2	240	7.8	4	196	349
" "	" "	Nov. 2	**	6.0	11.5	92.1	1.0	43	7.8	6	152	
N.Fk.Kentucky R. lower edge Whitesburg, Ky.	KyNf 404	Oct. 19	**	11.0	5.1	45.8	1.4	460	7.7	4	191	*
" "	" "	" 26	**	16.5	0.0	00.0	5.8	24,000	7.5	7	203	316
" "	" "	Nov. 2	**	6.5	8.8	71.4	0.9	460	7.7	5	166	
Sandlick Creek, 100 yds. above mouth	KyNfS 402	Oct. 20		17.5	11.1	115.0	0.6	46	6.8	3	13	
" "	" "	" 26		19.0	8.4	89.4	0.8	43	6.8	5	20	496
Rockhouse Creek, at mouth	KyNfR 390	Oct. 20		14.5	10.1	98.4	0.8	24	7.5	5	63	
" "	" "	" 27		20.0	8.1	88.1	1.6	240	7.4	60	69	
" "	" "	Nov. 2		4.5	11.6	89.7	0.8	43	7.4	7	69	
N.Fk.Kentucky River above Blackey, Ky.	KyNf 388	Oct. 20	4	15.0	10.4	102.3	1.1	2	7.9	5	123	
" "	" "	" 27	4	20.0	7.7	84.3	0.6	1	7.7	20	126	

TABLE Ky-7 KENTUCKY RIVER BASIN

OHIO RIVER POLLUTION SURVEY
LABORATORY DATA

SUMMARY OF INDIVIDUAL RESULTS

Sampling Point	Mileage From Mouth	Date 1939	Average Discharge c.f.s.	Temp. °C	Dissolved Oxygen p.p.m.	Dissolved Oxygen % Sat.	5 Day B.O.D. p.p.m.	Coliform M.P.N. Per ml.	pH	Turbidity p.p.m.	Alkalinity p.p.m.	Hardness p.p.m.
Line Fork Creek, mouth Ulvah, Ky.	KyNFL 380.5	Oct. 20	4	11.5	8.8	80.7	1.0	9	7.3	4	50	
" "	" "	" 27	4	19.5	5.8	63.1	2.3	46	7.0	18	52	
Big Leatherwood Cr. at mouth Cornettsville, Ky	KyNFL 379	Oct. 20		10.5	6.6	58.9	1.8	9	7.3	8	75	
" "	" "	" 27		18.0	3.9	40.9	4.2	240	7.1	145	57	
" "	" "	Nov. 2		5.0	8.9	69.2	1.9	23	7.3	8	67	115
Irishman Cr. 4½ miles above Sassafras, Ky.	KyNFCI 384	Oct. 31		8.5	10.7	91.2		240	4.9	4	15	
" "	" "	Nov. 3		4.0	12.1	92.1		4	6.1	8	11	
" "	" "	" 17		4.0	11.8	90.2	Lost	4	4.9	6		
Yellow Creek, - mouth Sassafras, Ky.	KyNfCY 380	Oct. 20		21.5	5.5	61.8	0.7	**	2.8	9		
" "	" "	" 27		22.0	5.1	57.3	6.8	**	2.8	43		
" "	" "	" 31		8.5	--	-	--	**	2.9	18		
" "	" "	Nov. 17		3.5	14.2	106.5	Lost	**	2.9	20		676
Carr Fork - mouth Jeff, Kentucky	KyNfC 368	Oct. 20		10.5	10.1	90.2	0.7	4	6.2	4	14	
" "	" "	" 27		18.0	6.2	65.2	1.4	9	6.5	4	17	
N.Fk. Kentucky R. abv. spray, Lothair, Ky.	KyNf 363	Oct. 25		25.5	7.5	89.9	0.7	93	7.8	14	96	
" "	" "	" 31		15.5	8.7	86.9	1.2	43	7.6	27	75	
N.Fk. Kentucky R. at water plant, Lothair	KyNf 362	Oct. 26		30.0	7.0	91.1	1.9	4	8.1	14	95	197
" "	" "	" 31		20.0	7.8	85.0	1.5	93	7.6	20	74	
N.Fk. Kentucky R. in pool abv. water intake, Hazard, Ky.	KyNf 361	Oct. 23		8.0	5.6	47.5	6.8	430	7.8	35	204	
" "	" "	" 27	9	21.0	8.0	89.2	2.1	9	7.6	15	83	
N.Fk. Kentucky R. above at waterwks., Hazard, Ky.	KyNf 360.5	Oct. 16	3	19.0	9.2	98.7	2.3	46	7.7	20	83	
" "	" "	" 23	3	19.0	9.7	103.6	3.3	240	7.6	15	83	
" "	" "	" 25	3	18.0	8.3	87.0	2.2	43	7.6	15	84	195
N. Fk. Kentucky River, midtown, Hazard, Ky.	KyNf 360.2	Oct. 16	3	9.5	7.9	68.8	1.6	150	7.4	17	86	
" "	" "	" 23	3	10.0	5.0	44.4	2.9	93	7.4	10	128	
N.Fk. Kentucky R. below last sewage, Hazard, Ky.	KyNf 360	Oct. 23	3	10.0	0.0	00.0	87.0	24,000	6.9	80	246	
N. Fk. Kentucky R. 100 yds. bel. last sewage, Hzd.	KyNf 359.8	Oct. 16	4	6.5	3.3	26.2	8.8	4,600	7.3	13	97	
N. Fk. Kentucky R. 712 ft bel. last sewage, Hazard	KyNf 359.5	Oct. 26	5	23.5	0.0	00.0	106.	110,000	7.4	110	237	296
Lott Cr. Mouth 3 mi. below Hazard, Ky.	KyNfLe 358	Oct. 23	7	10.0	9.2	81.1	2.1	240	7.9	5	202	245
" "	" "	" 27	7	18.5	7.4	78.2	3.5	1,100	7.2	173	60	
" "	" "	Nov. 2	7	6.5	12.4	100.7	2.0	460	7.4	8	78	
N.Fk. Kentucky R. bridge at Chavies, Ky.	KyNf 338	Oct. 17	5	17.0	11.0	112.5	1.9	1	7.6	13	82	
" "	" "	" 24	5	18.0	9.5	99.3	1.5	9	7.4	14	90	180

TABLE Ky-7 KENTUCKY RIVER BASIN

OHIO RIVER POLLUTION SURVEY
LABORATORY DATA

SUMMARY OF INDIVIDUAL RESULTS

Sampling Point	Mileage from Mouth	Date 1939	Average Discharge c.f.s.	Temp. °C	Dissolved Oxygen p.p.m.	Dissolved Oxygen % Sat.	5 Day B.O.D. p.p.m.	Coliform M.P.N. Per ml.	pH	Turbidity p.p.m.	Alkalinity p.p.m.	Hardness p.p.m.
Troublesome Creek, mouth Haddix, Ky.	KyNFT 316	Oct. 17		12.0	10.0	92.3	1.0	4	7.2	15	45	
" "	" "	" 24		11.5	8.7	79.3	0.8	4	7.2	14	46	
Quicksand Creek - mouth Quicksand, Ky.	KyNFQ 310	Oct. 17		11.0	9.8	88.9	1.9	240	7.2	12	52	
" "	" "	" 24		11.0	8.8	79.3	1.9	23	7.1	15	53	116
" "	" "	Nov. 3		9.5	11.6	101.4	—	4	7.2	18	201	
N.Fk. Kentucky R. 1 mi. above Jackson, Ky.	KyNF 306	Oct. 24	4	12.5	9.0	84.1	0.7	110	7.4	18	79	145
N. Fk. Kentucky R. upper edge Jackson, Ky.	KyNF 305.5	Oct. 17	15	11.5	10.3	94.3	1.5	9	7.5	16	71	
N.Fk. Kentucky R. ½ mi. below last sewage, Jksn.	KyNF 304.7	Oct. 17	15	11.5	8.0	72.7	3.2	4	7.6	35	129	
" "	" "	" 24	5	13.5	7.2	68.8	3.3	4	7.6	40	134	183
Middle Fork, Kentucky R. below Hyden, Ky.	KyMF 328	Oct. 16		10.5	9.2	81.8	0.9	7	7.3	11	37	
" "	" "	" 23		14.0	8.5	82.0	0.9	24	7.1	9	32	
Kentucky River, upper edge, Beattyville, Ky.	Ky 255	Sept. 29	148	25.0	7.5	89.0	2.1	240	7.3		61	
" "	" "	Oct. 3	148	20.0	6.4	69.7	1.5	9	7.2	13	63	
Red Bird Creek, bridge Big Creek, Ky.	KySFR	Oct. 16		11.0	8.8	79.2	1.6	[illegible]	7.3	28	47	
" "	"	" 23		14.5	8.0	77.9	1.7	4	7.3	27	45	
Goose Creek 1/4 mi. abv. Manchester, Ky.	KySFG 311.5	Oct. 16		13.0	6.7	63.0	1.7	9	7.2	12	64	
" "	" "	" 23		15.0	5.2	50.9	2.2	110	7.1	12	56	
" "	" "	Nov. 3		10.5	6.0	53.1		43	7.0	7	187	
Goose Cr. 50 yds. below last sewer, Manchester	KySFG 310.8	Nov. 3		8.5	8.3	71.1		240	7.2	10	193	
Goose Cr. 100 yds. below last sewer, Manchester	KySFG 310.6	Oct. 16		9.0	4.5	39.0	1.9	93	7.2	5	76	
" "	" "	" 23		11.5	4.9	44.4	5.7	15	7.3	7	79	
Kentucky R. 300 ft. below last sewer, Beattyville	Ky 254.7	Oct. 12	148	21.5	7.0	78.5	1.6	23	7.3	16	57	126
Kentucky R. ½ mi. below last sewer, Beattyville	Ky 254.3	Sept. 29	148	24.5	6.7	79.4	2.2	9	7.2		59	
Kentucky R. 1 mile below Beattyville, Ky.	Ky 253.8	Oct. 3	148	22.5	6.1	69.4	1.0	15	7.2	15	61	118
Kentucky R. 3/4 mile Above Pryse, Ky.	Ky 227	Sept. 29		24.5	7.7	90.8	2.4	9	7.2		43	
" "	" "	Oct. 3		21.5	4.7	52.4	2.4	4	7.0	11	52	113
Kentucky R. above Cow Cr. abv. Ravenna, Ky.	Ky 222	Sept. 29		24.5	7.4	87.6	3.0	2	7.1		51	
" "	" "	Oct. 3		20.5	5.2	57.8	2.2	240	7.0	14	56	120
" "	" "	" 12		21.0	5.2	57.5	1.0	43	7.1	11	51	
Kentucky R. 50 yds. below last sewage, Irvine, Ky.	Ky 217	Oct. 12	206	19.5	5.2	56.2	2.6	430	7.2	15	65	132

TABLE Ky-7 KENTUCKY RIVER BASIN

OHIO RIVER POLLUTION SURVEY
LABORATORY DATA

SUMMARY OF INDIVIDUAL RESULTS

Sampling Point	Mileage From Mouth	Date 1939	Average Discharge c.f.s.	Temp. °C	Dissolved Oxygen		5 Day B.O.D. p.p.m.	Coliform M.P.N. Per ml	pH	Turbidity p.p.m.	Alkalinity p.p.m.	Hardness p.p.m.
					p.p.m.	% Sat.						
Kentucky R. 100 yds. below new bridge, Irvine	Ky 216.5	Oct. 5	206	21.5	5.8	65.3	1.6	2,400	7.2	10	59	110
Kentucky R. 10 miles below Irvine, Ky.	Ky 208	Sept. 29		25.0	5.7	68.1	1.9	9	7.2		54	
Drowning Cr. 1/2 mile below Richmond, Ky.	KyCD 190	Sept. 29		18.5	6.6	69.8	6.8	150	7.6		145	
Drowning Creek - 1 mi. below Richmond, Ky.	KyCD 189.5	Oct. 2		9.5	6.9	54.6	5.0	240	7.5	5	154	207
" "	" "	" 10		18.5	3.6	38.3	6.7	93	7.5	85	163	197
Kentucky R. Bridge at Clay Ferry, Ky.	Ky 170	Sept. 25		22.5	5.8	66.3	1.1	93	7.4		52	
" "	" "	Oct. 2	206	18.5	7.1	74.9	0.0	4	7.4	12	60	95
" "	" "	" 10		21.0	6.7	74.5	1.7	**	7.5	9	61	104
Silver Creek, below Berea, Ky.	KySl 189	Oct. 10		20.0	4.6	49.8	3.8	240	7.1	10	65	151
Walnut Meadow Branch ½ mi. below outlet of Berea College	KyPW 188.5	Sept. 29		22.5	0.0	00.0	151	110,000	7.1		272	
" "	" "	Oct. 2		18.5	1.7	18.1	93	360	7.3	143	202	158
" "	" "	" 10		19.0	0.0	00.0	11.5	150	7.6	67	252	190
Kentucky R. Bridge on Rt. #27, Camp Nelson, Ky.	Ky 138	Sept. 28		23.0	7.6	88.0	1.8	4	7.7	12	86	
" "	" "	Oct. 4		19.5	8.5	91.7	0.6	1	7.7	25	84	119
" "	" "	" 9		22.0	8.6	97.2	1.3	**	7.6	15	84	128
Town Branch, 1/2 mi. below Nicholasville, Ky.	KyJT 141	Sept. 25		16.5	1.8	18.8	7.3	91	7.7		333	
" "	" "	Oct. 4		12.5	2.0	18.3	7.9	210	7.6	15	343	293
" "	" "	" 9		18.0	0.2	2.1	10.4	2,400	7.6	25	378	282
Town Branch- 3 miles below Nicholasville, Ky.	KyJT 138	Sept. 25		17.5	6.1	63.3	2.2	* 43	7.8		192	
" "	" "	Oct. 4		12.5	5.8	53.9	1.7	43	7.6	8	195	226
" "	" "	" 9		18.5	2.6	28.1	1.9	43	7.5	8	180	212
Jessamine Cr. 1 mi. below Wilmore, Kentucky	KyJ 134	Sept. 28		16.5	5.9	62.6	2.5	75	7.8	10	174	
" "	" "	Oct. 4		13.0	9.6	90.3	1.5	15	7.9	7	160	174
" "	" "	" 9		18.0	7.6	79.2	0.8	4	7.8	6	170	192
St. Asaph Cr. ½ mi. below last sewer, Stanford, Ky.	KyDLS 174	Sept. 28		22.0	2.0	22.1	9.0	230	7.9	44	374	
St. Asaph Cr. ½ mi. below disposal pit, Stanford	KyDLS 174	Oct. 4		13.0	4.0	37.5	3.6	460	7.6	15	230	232
St. Asaph Creek 1 mile below Stanford, Ky.	KyDLS 173	Oct. 9		17.5	1.4	15.0	4.8	23	7.6	13	359	381
Town Branch Creek, below Lancaster, Ky.	KyDT 162	Sept. 28		19.0	5.1	54.9	3.2	240	7.5	7	178	
Town Branch 1/2 mile below Lancaster, Ky.	KyDT 161.5	Oct. 4		13.5	6.7	64.2	1.4	43	7.6	6	167	241
Town Branch - 1 mile below Lancaster, Ky.	KyDT 161	Oct. 9		17.5	4.0	42.0	6.2	1,100	7.5	10	199	248

TABLE Ky-7 KENTUCKY RIVER BASIN

OHIO RIVER POLLUTION SURVEY
LABORATORY DATA

SUMMARY OF INDIVIDUAL RESULTS

Sampling Point	Mileage from Mouth	Date 1939	Average Discharge c.f.s.	Temp. °C	Dissolved Oxygen p.p.m.	Dissolved Oxygen % Sat.	5 Day B.O.D. p.p.m.	Coliform M.P.N. Per ml	pH	Turbidity p.p.m.	Alkalinity p.p.m.	Hardness p.p.m.
Clark Run - 1 mile below Danville, Ky.	KyDCr 154	Sept. 28		22.5	0.0	00.0	30.8	24,000	7.6	28	318	
" "	" "	Oct. 4		17.5	0.0	00.0	26.1	110,000	7.6	23	80	209
" "	" "	" 9		22.0	1.1	12.8	15.0	46,000	7.6	15	256	225
Town Branch 1 mi. below Danville, Ky.	KyDT 154	Sept. 28		24.5	3.0	35.6	34.2	2,400	7.7	121	374	
" "	" "	Oct. 4		20.0	4.4	48.2	9.2	2,400	7.7	68	307	234
" "	" "	" 9		24.0	1.5	17.4	17.8	11,000	7.6	270	335	237
Kentucky River - 1 mile above Frankfort, Ky.	Ky 67	Sept. 27		24.0	8.7	102.5	2.0	43	[illegible]	15	86	
" "	" "	Oct. 5		20.0	6.7	73.4	1.7	4	7.6	23	91	127
Benson Creek - 1 mile above Frankfort, Ky.	KyB 68	Sept. 27	331	23.0	7.8	90.0	3.2	9	7.9	34	92	
" "	" "	Oct. 5	600	19.0	5.9	63.0	2.2	240	7.5	26	94	131
" "	" "	" 13	396	15.0	6.8	66.5	4.3	93	7.8	64	104	152
Kentucky River, Lock #4 Frankfort, Ky.	Ky 65	Sept. 27	331	23.5	6.6	76.3	2.4	240	7.8	13	87	
" "	" "	Oct. 5	600	20.0	5.2	56.9	1.8	460	7.6	19	89	130
Penitentiary Run - at Kentucky R. below Frankfort, Ky.	KyP 65	Sept. 27	331	21.5	0.0	00.0	107.4	24,000	6.9	360	238	
" "	" "	Oct. 5	600	20.0	0.0	00.0	183	240,000	7.0	230	246	292
" "	" "	" 13	396	16.5	0.0	00.0	389	240,000	6.7	185	311	406
Kentucky River, 4 miles below Frankfort, Ky.	Ky 62	Sept. 27		23.5	3.4	39.4	2.6	93	7.3	18	86	
" "	" "	Oct. 5		20.5	4.2	46.5	1.9	240	7.4	25	89	128
N. Elkhorn Cr. Corp. line above Georgetown, Ky.	KyElNf 92	Sept. 26		19.0	5.5	58.8	0.3	4	7.8	11	179	
" "	" "	Oct. 5		18.0	9.0	93.8	2.6	46	8.0	14	192	206
N. Elkhorn Cr. 100 yds. below last sewage outlet Georgetown, Ky.	KyElNf 90	Oct. 13		14.0	0.0	00.0	28.5	24,000	7.3	47	268	268
N. Elkhorn Cr. 1 mi. below Georgetown, Ky.	KyElNf 89	Sept. 26		19.5	1.8	19.8	7.1	73	7.6	13	250	
" "	" "	Oct. 5		19.0	4.7	50.5	26.9	23	7.7	47	254	239
Locust Creek 1/2 mi. below Stamping Ground	KyElNfL 75	Sept. 26		18.0	4.7	49.7	2.6	93	7.6	28	141	
" "	" "	Oct. 5		20.5	9.7	107.2	2.1	23	8.0	12	140	184
Town Branch Cr. 1 mi. below Lexington, Ky.	KyElSfTb 113	Sept. 25		24.5	2.0	23.3	20.9	4,300	7.4		147	209
" "	" "	Oct. 2		18.4	6.6	70.2	7.9	4,600	7.6	10	147	
" "	" "	" 10		22.5	4.2	48.2	5.5	4,600	7.6	11	205	188
S. Fk. Elkhorn Cr. ½ mi. below Narcotic Farm disposal, Lexington, Ky.	KyElSf 95	Sept. 26		29.5	1.9	24.8	3.6	430	7.2	10	98	174
" "	" "	Oct. 2		24.5	4.0	47.0	2.3	460	7.0	8	70	
" "	" "	" 10		27.5	1.9	24.0	3.4	240	7.2	7	98	152
" "	" "	" 13		20.5	4.0	43.6	11.4	11,000	7.5	28	157	181
Town Branch Creek 1 mi. below Versailles, Ky.	KyElSfTb 95	Sept. 28		24.0	4.8	56.6	5.0	460	7.6	162	180	
" "	" "	Oct. 5		14.5	6.3	61.1	2.4	93	7.6	22	149	213
Lee Branch-200 ft. below disposal plt. Midway, Ky	KyElSfL 82	Sept. 26		20.5	5.7	62.4	3.6	240	7.6	9	176	
" "	" "	Oct. 5		20.5	9.3	102.6	3.7	23	8.0	7	189	
S.Fk.Elkhorn Cr. Bridge at Fk.Elkhorn Creek	KyElSf 67	Sept. 26		20.5	10.3	113.1	3.5	15	8.4	14	205	

TABLE Ky-7 KENTUCKY RIVER BASIN

OHIO RIVER POLLUTION SURVEY
LABORATORY DATA

SUMMARY OF INDIVIDUAL RESULTS

Sampling Point	Mileage from Mouth	Date 1939	Average Discharge c.f.s.	Temp. °C	Dissolved Oxygen p.p.m.	Dissolved Oxygen % Sat.	5 Day B.O.D. p.p.m.	Coliform M.P.N. Per ml.	pH	Turbidity p.p.m.	Alkalinity p.p.m.	Hardness p.p.m.
S.Fk.Elkhorn Cr. Bridge at Fk.of Elkhorn Cr.	KyElSf 67	Oct. 5		19.0	9.1	97.4	1.5	8	8.2	16	213	199
Kentucky River, Gratz, Ky.	Ky 29	Mar. 2		6.0	12.3	99.0	1.7	0				
" "	" "	" 9		11.0	10.7	96.8	1.5	43				
" "	" "	" 17		8.5	11.4	97.4	0.7	23	8.0	200	57	
" "	" "	" 21		9.0	11.8	101.9	1.2	9	8.0	160	57	
" "	" "	" 29		11.0	11.4	103.0	1.8	110	7.9	140	71	
" "	" "	Apr. 6		9.5	11.4	99.1	1.7	24	7.5	450	67	
" "	" "	" 14		9.5	12.2	106.0	1.6	43	7.7	110	55	
" "	" "	" 24		14.0	10.6	102.3	0.7	20	7.5	95	74	
" "	" "	May 2		15.5	9.7	96.8	1.8	23	7.7	85	66	
" "	" "	" 10		18.0	9.0	94.3	1.1	4	8.0	45	77	
" "	" "	" 18		19.5	8.9	96.1	1.3	5	8.0	18	80	
" "	" "	" 26		22.5	8.7	99.1	2.1	5	7.8	20	80	
" "	" "	June 1		23.5	7.7	89.2	1.1	11	7.7	25	77	
" "	" "	" 9		25.0	7.2	86.3	1.9	24	7.8	102	77	
" "	" "	" 15		23.5	8.1	94.4	1.5	23	7.8	79	71	
		1940										
" "	" "	Feb. 5		2.0	13.3	96.4	1.1	**	7.8	15		
" "	" "	" 13		3.5	13.7	103.0	1.8	21	7.5		81	
" "	" "	" 20		5.0	12.6	98.5	2.2	9	7.5	320	67	
" "	" "	" 27		5.5	13.0	102.8	1.2	9	7.5	87	69	
" "	" "	Mar. 4		7.0	10.6	86.7	2.7	43	7.4	690	62	
" "	" "	" 8		6.0	11.9	95.4	1.4	15	7.5	350	48	
		1939										
Kentucky River at mouth Carrollton, Ky.	Ky 0.2	Mar. 9	62,700	9.5	10.9	94.8	1.4	93				
" "	" "	" 17	15,400	8.5	10.8	92.4	0.6	15	7.8	280	63	
" "	" "	" 23	6,310	10.0	11.4	100.7	1.2	23	8.1	190	67	
" "	" "	" 31	22,600	9.0	10.8	93.4	3.2	43	7.8	750	69	
" "	" "	Apr. 6	22,800	9.5	11.2	98.1	1.7	43	7.4	450	74	
" "	" "	" 14	24,300	9.5	12.0	104.3	1.6	15	7.7	72	51	
" "	" "	" 24	9,630	14.0	9.8	95.0	1.5	43	7.6	160	86	
" "	" "	May 2	6,970	16.0	9.7	97.7	1.4	7	7.8	62	75	
" "	" "	" 10	3,800	19.0	—	—	2.1	3	8.0	47	84	
" "	" "	" 18	1,670	20.0	8.2	90.1	1.6	[illegible]	7.9	20	89	
" "	" "	May 26	3,100	23.0	9.3	107.1	6.7	**	7.9	20	90	
" "	" "	June 1	2,470	24.0	7.4	87.2	2.6	2	7.8	25	86	
" "	" "	" 9	3,170	26.0	7.3	88.6	2.6	1	7.7	57	86	
" "	" "	" 15	2,790	25.0	7.6	90.5	1.7	9	8.0	65	68	
" "	" "	" 23	10,900	25.0	7.9	94.5	1.7	93	7.6	600	78	
" "	" "	" 29	3,170	26.0	7.2	87.3	1.4	46				
" "	" "	July 7	62,000	27.0	6.7	83.0	3.4	460	7.5	940	72	
" "	" "	" 13	4,950	26.0	7.8	94.6	2.9	93	7.2	800	46	
" "	" "	" 21	2,410	26.0	7.2	87.2	1.2	23	7.3	220	64	
" "	" "	" 27	6,400	26.0	6.8	83.0	2.9	240	7.3	700	66	
" "	" "	Aug. 4	6,190	25.0	6.4	76.1	1.5	23	7.5	170	80	
" "	" "	" 10	1,470	26.0	6.5	78.8	1.4	43	7.5	220	82	
" "	" "	" 18	2,310	26.5	6.0	73.3	1.9	23	7.3	340	77	
" "	" "	" 24	1,630	26.0	6.4	77.9	1.7	9	7.8	72	91	
" "	" "	Sept. 1	1,610	25.5	7.0	84.7	1.2	5	7.5	15	88	
" "	" "	" 7	950	25.0	8.1	97.5	1.4	2	7.9	15	86	

TABLE K-7 KENTUCKY RIVER BASIN

OHIO RIVER POLLUTION SURVEY
LABORATORY DATA

SUMMARY OF INDIVIDUAL RESULTS

Sampling Point	Mileage From Mouth		Date 1939	Average Discharge c.f.s.	Temp. °C	Dissolved Oxygen p.p.m.	Dissolved Oxygen % Sat.	5 Day B.O.D. p.p.m.	Coliform M.P.N. Per ml	pH	Turbidity p.p.m.	Alkalinity p.p.m.	Hardness p.p.m.
Kentucky River, mouth Carrollton, Kentucky	Ky	0.2	Sept. 15	950	27.0	8.9	110.7	1.6	2	8.1	7	95	
" "	"	"	" 21	267	23.5	7.2	83.4	1.4	9	7.7	20	94	
" "	"	"	" 29	1,370	23.5	5.8	67.8	0.7	**	7.5	10	103	
" "	"	"	Oct. 5	760	20.5	5.8	64.2	1.1	11	7.5	12	96	
" "	"	"	" 13	502	20.0	5.4	59.0	1.0	2	7.5	9	104	
" "	"	"	" 19	0	17.5	6.7	69.5	1.2	**	7.5	6	104	
" "	"	"	" 27	586	16.5	7.2	75.8	0.9	4			102	
" "	"	"	Nov. 2	950	13.0	7.6	72.0	1.2	9	7.5		101	
" "	"	"	" 10	592	12.0	8.4	77.6	0.6	9	7.5			
" "	"	"	" 16	586	9.0	9.9	85.4	1.0	2	7.4		86	
" "	"	"	" 24	760	9.0	9.1	76.7	3.4	1		15	96	
" "	"	"	" 30	760	8.0	9.4	78.9	0.8	2				
" "	"	"	Dec. 8	586	7.0	10.2	83.7	1.0	**			99	
" "	"	"	" 14	586	6.0	10.2	81.7	3.2	24	7.4	10	96	
" "	"	"	" 22	420	—	10.9	—	0.8	36	7.5	15	104	
" "	"	"	" 28	1,370	2.5	11.4	83.5	0.6	4	7.5	25	103	
" "	"	"	1940 Feb. 5	380	2.0	13.5	97.4	0.9	**	7.8	13		
" "	"	"	" 13	12800	5.5	13.0	102.8	2.0	24	7.5		85	
" "	"	"	" 20	20700	4.5	12.2	94.1	1.9	43	7.5	380	66	
" "	"	"	" 27	6,150	5.0	12.7	99.4	0.9	15	7.6	85	78	
" "	"	"	Mar. 4	56600	7.5	9.8	81.1	2.8	93	7.5	1,000	52	
" "	"	"	" 8	11300	6.0	11.6	93.0	0.9	23	7.5	250	53	
" "	"	"	" 15	6,870	5.0	11.8	92.4	0.9	46	7.5	195	69	
" "	"	"	" 21	13900	7.0	12.2	100.3	1.8	8	7.5	100	59	
" "	"	"	" 29	3,050	9.0	11.8	101.4	1.1	2	7.5	70	68	
" "	"	"	Apr. 4	15200	13.0	10.3	97.2	1.4	24	7.3	310	54	
" "	"	0.5	July 22	3,120	26.0	7.4	90.3	2.1	23	7.4	100	59	
" "	"	"	" 24	1,840	27.0	7.2	89.5	1.9	4	7.5	55	60	
" "	"	"	" 26	1,570	27.5	6.9	86.5	2.2	24	7.5	95	62	
" "	"	0.2	July 18	7,510	25.5	7.8	94.0	1.6	23	7.4	82	58	
" "	"	"	" 22	3,120	25.5	7.5	90.6	2.1	23	7.4	110	63	
" "	"	"	" 24	1,840	27.5	7.2	89.9	1.8	43	7.5	56	59	
" "	"	"	July 26	1,570	27.5	7.0	87.6	1.8	24	7.5	70	62	
" "	"	"	Oct. 15	2,160	18.5	7.4	78.6	1.3	4	7.5	13	63	
" "	"	"	" 17	2,040	17.0	9.6	98.2	1.9	110	7.7	15	59	
" "	"	"	1941 Jan. 17	4,320	5.0	12.4	96.6	2.6	5	7.3	40	73	
" "	"	"	" 21	3,060	5.5	12.2	96.8	3.6	4	7.3	88	81	110
" "	"	"	" 23	2,580	4.5	12.4	95.3	3.1	46	7.5	90	83	

** Less than one

LICKING RIVER BASIN

Final Report to the Ohio River Committee

Ohio River Pollution Survey

U. S. Public Health Service
Cincinnati, Ohio
1942

LICKING RIVER BASIN

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LICKING RIVER BASIN*

Syllabus and Conclusions

Syllabus

The Licking River drains 3,670 square miles in northeastern Kentucky, part of which is mountainous but most of which is in the fertile Bluegrass section. The basin is primarily an agricultural area; there are no large cities and most of the population is rural. The two largest towns have installed sewage treatment plants. The remaining sources of pollution, all of them small, present no particularly difficult problems. Flow regulation by use of proposed flood control reservoirs will have no important effect on the pollution problem.

Conclusions

(1) Thirteen of the seventeen public water supplies in the basin come from surface sources. Two of these are seriously affected by sewage pollution.

(2) A total of 25,200 people are connected to sewers and 11,200 to the two sewage treatment plants in the basin. Industrial wastes from seven small plants have a population equivalent of 3,300. The population equivalent of all sewage and industrial wastes as discharged is 18,900.

(3) Laboratory data indicate rather rapid recovery of the streams from the effects of pollution. A number of the smaller tributaries are grossly polluted in the vicinity of the sewer outfalls.

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* For maps of this Basin, see Kentucky River Basin.

(4) Available waste treatment methods can restore the streams of the basin to satisfactory conditions.

(5) A summary of cost estimates of remedial measures from Table L-1 follows:

Treatment	Capital Cost	Annual Cost
Existing	$290,000	$30,000
Suggested Additional	710,000	70,000

Estimated additional costs, over existing charges, of programs involving uniform treatment throughout the basin are:

Primary, all places	$500,000	$45,000
Secondary, all places	740,000	75,000

Table L-1 Licking River Basin - Estimated Cost of Existing and Suggested Minimum Corrective Measures for Sewage and Industrial Wastes, with Comparative Cost for Primary and Secondary Treatment.

	Number of Plants		Population Connected to Sewers	Capital Investment (Dollars)	Annual Charges (Dollars)		
	Prim.	Sec.			Amort. & Interest	Operation & Main.	Total
Existing Sewage Treatment	0	2	11,200	290,000	20,000	10,000	30,000
Suggested Minimum Correction							
Sewage Treatment Plants	2	11	14,000	520,000	36,000	24,000	60,000
Required Interceptors			-	180,000	8,000	-	8,000
Independent Industrial Waste Correction	-		-	10,000	1,000	1,000	2,000
Total				710,000	45,000	25,000	70,000
Comparative Cost							
Primary Treatment all Waste				500,000	30,000	15,000	45,000
Secondary Treatment all Waste				740,000	50,000	25,000	75,000
As Suggested				710,000	45,000	25,000	70,000

Description

The Licking Basin comprises 3,670 square miles of northeastern Kentucky immediately to the north and east of the Kentucky Basin which it resembles topographically and culturally. The headwaters are in a mountainous area and the western and northern portions of the basin are in the Bluegrass section. Agriculture is the principal industry. There are only four urban communities in the basin outside of Campbell and Kenton Counties at the mouth of the river. These counties are in the Cincinnati metropolitan area and their population is omitted from the following summary.

	Populations			
Urban Communities	1910	1920	1930	1940
Winchester	7,156	8,333	8,233	8,594
Paris	5,859	6,310	6,204	6,697
Cynthiana	3,603	3,857	4,386	4,840
Mt. Sterling	3,932	3,995	4,350	4,782
Basin				
Rural	149,724	144,209	138,639	145,230
Urban	20,550	22,495	23,173	24,913
Total	170,274	166,703	159,812	170,143

The only important tributary is the South Fork which drains about 950 square miles of the Bluegrass section and joins the main stream at Falmouth (mile 51). All four of the urban communities are in the area drained by the South Fork.

Water Uses - The Licking River is not considered a navigable stream. There are no flood control or hydroelectric reservoirs in the basin. Most of the streams of the basin are used for fishing and bathing by local residents but there are no outstanding recreational developments.

Table L-2 Licking River Basin - Surface Water Supplies

Supply	Source	Mile (1)	Treat-ment (2)	Popu-lation Served	Con-sumption M.G.D.
Supplies Below Community Sewer Outfalls					
Falmouth	Licking River	51.3	FD	2,100	0.30
Cynthiana	S.Fk. " "	82	FD	4,500	0.45
Millersburg	Hinkston Creek	100	CD	900	0.02
Paris	Stoner Creek	101	FD	6,500	0.80
Winchester	Impounded- Kentucky R.(3)	-	FD	9,000	0.45
Other Surface Supplies					
Owingsville	Slate Creek	155	FD	500	0.02
Mt. Sterling	" "	175	FD	4,800	0.23
Morehead	Triplett Creek	179	FD	3,000	0.15
Walton	Impounded	-	CD	700	0.03
Williamstown	Impounded	-	FD	1,200	0.04
Carlisle	"	-	FD	1,800	0.04
Flemingsburg	"	-	FD	900	0.02
Alexandria (4)	"	-	FD	300	0.01
Total - Below Sewer Outfalls				23,000	2.02
Other				13,200	0.54
Total - Surface Water Supplies				36,200	2.56

(1) Miles above mouth of Licking River.
(2) F - Coagulated, settled, filtered, D - Chlorinated, C - Coagulated, settled.
(3) Emergency intake in Kentucky River (mile 180).
(4) Under construction (1941).

Table L-3 Licking River Basin - Sources of Pollution, Including Industrial Wastes, Expressed as Sewered Population Equivalent (B.O.D.).

Municipality	Stream	Miles Above Mouth of Licking R.	Population Connected to Sewers	Treatment	Sewered Population Equivalent (B.O.D.	
					Untreated	Discharged
Falmouth	Licking River	51	1,000	None	1,100	1,100
Salyersville	" "	274	500	"	500	500
Cynthiana	So.Fork Licking R.	82	4,300	"	4,700	4,700
Lair	" " " "	88	-	-	1,800	1,800
Paris (1)	" " " "	100	4,900	Secondary	4,900	700
Walton	Cruise Creek	35	200	None	900	900
Millersburg	Hinkston Creek	100	500	"	500	500
Mt. Sterling	" "	125	3,300	"	3,500	3,500
Winchester	Strode's Creek	120	6,300	Secondary	6,400	1,000
Flemingsburg	Town Branch Fleming Cr.	129	500	None	500	500
Morehead	Triplett Creek	179	2,300	"	2,300	2,300
Small Sources (5 towns)	-	-	1,400	"	1,400	1,400
Total			25,200	-	28,500	18,900

(1) Treatment plant under construction at time of laboratory survey.

FIG L-2

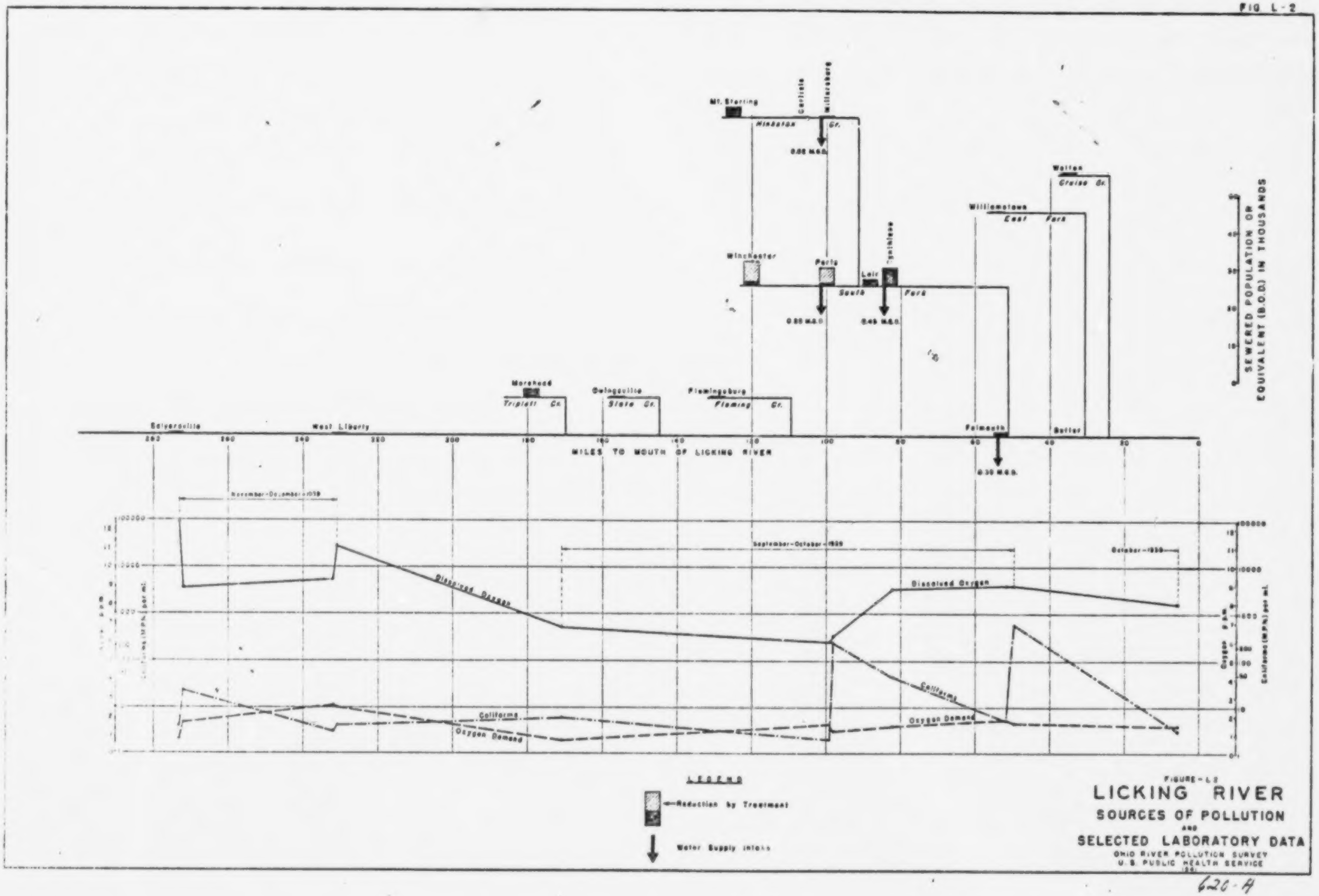

FIGURE-L2
LICKING RIVER
SOURCES OF POLLUTION
AND
SELECTED LABORATORY DATA
OHIO RIVER POLLUTION SURVEY
U.S. PUBLIC HEALTH SERVICE
1941

620-A

Presentation of Field Data

Figure Ky-1 shows the location and magnitude of each source of pollution of consequence in the basin. Figure L-2 shows similar data and, in addition, the location of water supply intakes from streams below sources of pollution and laboratory data on coliform organisms, dissolved oxygen and B.O.D.

Public Water Supplies - Thirteen of the seventeen communities with public water supplies depend on surface sources. The four underground supplies serve 1,700 people and the 13 surface supplies serve 36,200. Five of the surface supplies are from streams below sources of pollution while the other eight are from small impounding reservoirs or from creeks above the entrance of any sewage. Table L-2 shows data on the surface water supplies of the basin.

Sewerage - Table L-3 shows the sewered population at each of the more important sources of pollution. Of the 25,200 people connected to sewers, about 45 percent are connected to the two sewage treatment plants in the basin.

Industrial Wastes - There are seven small sources of industrial wastes in the basin outside the Cincinnati metropolitan area near the mouth of the Licking River. Table L-4 shows information on the waste disposal practices of these plants.

Table L-4 Licking River Basin - Summary of Industrial Wastes not Discharging to Municipal Treatment Plants, with Total of Entire Industrial Waste Load in the Basin.

Industry	Number of Plants	Industrial Waste Disposal		At Least Minor Corrective Measures Taken	Estimated Sewered Population Equivalent (B.O.D.)
		Munic. Sewers	Private Outlets		
Meat	2	1	1	2	400
Milk	2	1	1	2	300
Miscellaneous	3	1	2	1	2,600
Waste Unconnected Munic. Treatment	7	3	4	5	3,300
Waste Connected to Municipal Treatment					0
Total - Industrial Waste in Basin					3,300

Presentation of Laboratory Data

The laboratory data are summarized in Table L-7. Selected laboratory data at some of the more important points are shown in Table L-5. Samples were collected over a period of several months at Newport, Latonia, Butler, Falmouth and Cynthiana and analyzed at the Cincinnati laboratory. All other points shown were sampled from a mobile laboratory unit during the low-flow period from September to December, 1939.

Figures Ky-3, Ky-4 and Ky-5 show by means of symbols the coliform, dissolved oxygen and oxygen demand results at the various stations. The results thus shown are the averages of from one to three samples collected over short periods of less than one month at each of the mobile laboratory sampling points and indicate the most unfavorable monthly average at each of the points sampled from Cincinnati, where observations extended over a period of several months.

The laboratory observations show the worst conditions along the main Licking River occurring below Blue Lick Springs, Falmouth and Butler. On the South Fork bad conditions were found below Winchester, Paris and Cynthiana and below Mt. Sterling and Millersburg on Hinkston Creek. Complete absence of dissolved oxygen was observed at Mt. Sterling and Paris and averages of 1.2 and 1.0 p.p.m. were observed below Millersburg and Winchester. Less than 3.0 p.p.m. were found at Carlisle and Morehead. The coliform observations are in general agreement with the dissolved oxygen and oxygen demand results as indicators of the major sources of pollution. There is a tendency for the coliforms to indicate a somewhat heavier degree of pollution than the dissolved oxygen at some stations as is shown by the results at Flemingsburg, Morehead, Blue Lick Springs and Falmouth.

The 5-day B.O.D. results for the most part lie within a range of from about 1 to 3 p.p.m. except immediately below sources of pollution and here the average values did not generally tend to exceed 5 or 6 p.p.m., except below Mt. Sterling with 31.6 p.p.m., Carlisle with 16.5 p.p.m., Winchester with 20.7 p.p.m., Paris with 44.9 p.p.m.,Cynthiana with 24.5 p.p.m. and Newport with 12.1 p.p.m. in January, 1940. The pH ranged generally between about 7.0 to 8.0. The alkalinities varied from about 50 to 300 p.p.m. and the hardness ranged from 100 to 200 p.p.m. where these determinations were made.

Where samples were taken over a period of months the indications were that the coliforms and the oxygen demand reached their lowest concentrations during the low-water months from September through December, 1939. This is true above Falmouth and Latonia and is indicative of the effects of long flow times upon the natural purification phenomenon.

The laboratory observations indicate that the natural recovering processes clear the stream in this basin within relatively short distances below sources of pollution at times of low flows. Such indications are not shown in those stretches at which increased flows were also observed.

Biological Summary - The plankton population of the Licking, as a whole, is not high, usually less than 1,000 p.p.m. except below Paris and Cynthiana, where the effects of pollution are indicated by an increase in total plankton.

Table L-5 Licking River Basin - Selected Laboratory Data

River Location	Licking above Salyersville	Licking below Salyersville	Licking Bridge Farmers	Licking above Falmouth	Licking below Falmouth	Licking below Falmouth	Licking above Latonia
River Miles Above: Mouth of Licking	273	272	171	51.5	49.4	49.4	5.5
Period - 1939	11-27 & 30	11-30	9-19 & 21	7-10 & 24	7-10 & 24	Oct. 16	10-9 & 16
Number of Samples	2	1	2	2	2	1	2
Flow in c.f.s.: Sampling Days	5	5	30	12,115	12,400	50	63
Minimum Month	-	-	2.2	5.5	5.5	5.5	-
Water Temperature °C	2.3	0.5	20.5	25.5	25.3	11.5	15.8
Coliforms per ml.	4	23	6	253	285	1,100	3
Dissolved oxygen ppm.	12.4	8.9	6.8	6.4	6.8	9.9	8.0
B.O.D., 5-day, p.p.m.	0.8	1.7	0.7	2.5	2.1	1.5	1.5

River Location	Triplett Cr. below Morehead	Hinkston Cr. below Mt.Sterling	Strodes Cr. bel. Winchester	Stoner Creek above Paris	Stoner Creek below Paris	South Fork above Cynthiana	South Fork below Cynthiana
River Miles Above: Conf. with Licking	9	73	68	49	47.5	30.5	29
Mouth of Licking	179	124	119	100	98.5	81.5	80
Period - 1939	9-19 & 21 & 10-4	Sept.	Sept.	Sept.	Sept.	9-13 & 10-11	Oct.
Number of Samples	3	5	5	3	3	2	1
Flow in c.f.s.: Sampling Days	1	-	-	-	-	5	5
Water Temperature °C	20.3	20.2	18.9	22.5	23.3	20.8	20.5
Coliforms per ml.	528	84,400	41,660	5	46,000	35	930
Dissolved oxygen ppm.	2.5	0.0	1.0	6.7	0.0	4.3	1.6
B.O.D., 5-day, p.p.m.	4.3	31.6	20.7	1.7	44.9	2.2	24.5

Hydrometric Data

Seven stream gaging stations have been maintained on the Licking and the South Fork for various periods, only one of which is in operation at the present time. Table L-6 shows monthly mean summer flows during some of the low-flow years.

Table L-6 Locking River Basin - Monthly Mean Summer Flows for Years in Which Low Summer Flows have Occurred.

River Location		Licking at Catawba, Ky.	South Fork Licking at Hayes, Ky.
River Miles Above:			
Conf. with Licking R.		-	3
Mouth of Licking River		48	55
Drainage Area Sq. Mi.		3,300	922
Period of Record		1928-1940	1928-1931
Year		1930	1930
June	c.f.s.	94.1	14.5
July	"	17.0	0.7
August	"	13.7	0.
September	"	11.6	0.
Year		1936	1931
June	"	95.3	56.1
July	"	29.5	271
August	"	198	124
September	"	440	68.1
Year		1937	1929
June	"	1,505	398
July	"	626	1,200
August	"	343	81.6
September	"	87.4	570

Low-flow Regulation - A study of a proposed flood-control program, involving reservoirs on the main Licking River at Falmouth and Cave Run, has been made by the U. S. Engineer Department and consideration has been given to pollution control through multi-purpose use of these reservoirs.

Although seasonal low-flow control incidental to reservoir operations conducted primarily for other purposes is both beneficial and desirable, studies indicate that no reduction in the degree of treatment required under present conditions will be possible. Hence, little tangible value can be assigned to this added stream discharge.

Discussion

The pollution problems of the Licking River Basin are largely local ones and are concentrated in the area drained by the South Fork. Because of the low flows to which the streams are subject, secondary treatment will be required at most of the communities except Falmouth and Butler, where primary treatment will be sufficient. The water supplies at Millersburg and at Cynthiana are subject to rather heavy pollution. At Millersburg better water treatment facilities are needed and the water intake is subject to pollution by drainage from the town itself. Improvements and enlargements are needed at the Winchester sewage treatment plant.

The estimated cost of the suggested pollution abatement program is shown in Table L-1 together with estimates of the cost of treatment works already constructed and for comparative programs of primary treatment everywhere and of secondary treatment everywhere.

TABLE L-7 LICKING RIVER BASIN

OHIO RIVER POLLUTION SURVEY
LABORATORY DATA

SUMMARY OF INDIVIDUAL RESULTS

Sampling Point	Mileage From Mouth	Date 1939	Average Discharge c.f.s.	Temp. °C	Dissolved Oxygen p.p.m.	Dissolved Oxygen % Sat.	5 Day B.O.D. p.p.m.	Coliform M.P.N. Per ml	pH	Turbidity p.p.m.	Alkalinity p.p.m.	Hardness p.p.m.
Licking River above all sewage-Salyersville	Li 273	Nov. 27	5	0.5	13.1	90.9	0.7	3	7.0	5	38	
" "	" "	" 30	5	4.0	11.7	89.1	0.8	4	7.0	7	44	
Licking River upper edge Salyersville, Ky.	Li 272.5	" 20	5	9.0	8.0	68.9	Lost	93	6.9	6	41	92
Licking River 200 ft. Bel. last sew. outlet Salyersville, Ky.	Li 272	" 30	5	4.5	8.9	68.9	1.7	23	6.8	7	43	
Licking River - ½ mi. Below Salyersville, Ky.	Li 271.8	" 27	5	0.5	11.0	76.2	2.4	93	6.9	9	43	
Licking River - 1 mile Below Salyersville, Ky.	Li 271	" 20	5	9.0	8.3	71.6	Lost	23	7.0	9	45	146
Licking River above West Liberty, Ky.	Li 232	" 20	27	8.0	7.9	66.4	Lost	4	6.8	18	45	107
" "	" "	" 27	27	0.5	9.4	65.0	4.2	1	6.9	20	45	
" "	" "	" 30	27	4.0	10.7	81.6	1.0	4	6.9	15	44	
Licking R. - lower edge West Liberty, Ky.	Li 231.5	" 27	27	2.5	10.9	79.7	4.0	4	7.0	8	47	
" "	" "	" 30	27	4.0	11.3	86.0	2.5	4	7.0	12	47	
Licking R.-½ mi. below West Liberty, Ky	Li 231	Nov. 20	27	8.5	8.7	74.2	Lost	23	7.0	22	48	97
Licking River - Bridge Farmers, Kentucky	Li 171	Sept. 19	30	20.5	6.5	71.5	0.6	4	7.3	14	56	
" "	" "	" 21	30	20.5	7.0	77.3	0.7	9	7.2	23	58	
Triplett Creek - 1 mi. Below Morehead, Ky.	LiT 178	Sept. 19		20.5	2.2	23.8	3.3	23	6.9	11	57	
" "	" "	" 21		21.0	3.1	34.3	6.8	1,100	7.0	25	69	
" "	" "	Oct. 11		19.5	2.2	23.8	2.8	460	6.9	12	70	123
Town Branch Fleming Cr. 1 mile below Flemingsburg, Ky.	LiFt 129	Sept. 19	1	20.0	5.9	64.3	8.0	150	7.8	36	149	
" "	" "	" 22	1	20.5	7.6	84.3	2.9	93	7.6	32	150	
" "	" "	Oct. 11	1	17.5	7.4	77.0	2.7	240	7.7	27	201	218
Licking River - upper edge Blue Lick Springs	Li 99	Sept. 18	48	23.5	5.9	68.8	2.3	2	7.5	32	80	
" "	" "	Sept. 20	48	23.5	6.1	70.8	1.0	2	7.5	40	79	
Licking River upper edge Blue Lick Springs	" 98	" 18	49	23.5	6.3	72.9	1.3	240	7.4	37	80	
Licking River - bridge above Claysville, Ky.	Li 52	Sept. 18	73	26.0	8.5	103.2	1.7	46	7.9	54	86	
" "	" "	" 20	73	24.0	9.1	106.3	1.3	46	7.9	51	86	
Hinkston Creek ½ mile Above Mt. Sterling, Ky.	LiFH 126	Sept. 12		20.5	9.1	100.2	5.4	36	7.9	80	144	
" "	" "	" 14		24.0	4.5	52.6	6.9	2	7.7	61	133	
Hinkston Creek - 1 mi. Below Mt. Sterling, Ky.	LiSFH 124	Sept. 12		21.0	0.0	00.0	54.3	46,000	7.5	32	323	
" "	" "	" 14		26.0	0.0	00.0	43.6	110,000	7.6	30	329	
" "	" "	" 19		19.5	0.0	00.0	18.0	46,000	7.6	15	339	
" "	" "	" 21		19.0	0.0	00.0	21.0	110,000	7.5	15	272	
" "	" "	" 22		15.5	0.0	00.0	41.1	110,000	7.5	28	322	
Hinkston Creek - 3 mi. Below Mt. Sterling, Ky.	" 122	" 21		19.0	3.2	34.0	7.3	240	7.6	26	261	
" "	" "	" 22		15.5	2.8	28.2	29.5	36	7.5	47	242	
Hinkston Creek 1 mile Above Millersburg, Ky.	LiSFH 101	Sept. 15		25.5	14.7	176.9	7.1	15	8.7	32	147	

TABLE L-7 LICKING RIVER BASIN

OHIO RIVER POLLUTION SURVEY
LABORATORY DATA

SUMMARY OF INDIVIDUAL RESULTS

Sampling Point	Mileage From Mouth	Date 1939	Average Discharge c.f.s.	Temp. °C	Dissolved Oxygen p.p.m.	Dissolved Oxygen % Sat.	5 Day B.O.D. p.p.m.	Coliforms M.P.N. Per ml.	pH	Turbidity p.p.m.	Alkalinity p.p.m.	Hardness p.p.m.
Hinkston Creek - 1 mile Above Millersburg, Ky.	L15fH 101	Sept. 18		22.0	5.9	66.9	4.5	110	7.6	55	154	
" "	" "	" 20		23.5	10.2	118.1	4.9	24	7.9	51	154	
Hinkston Creek upper edge Millersburg, Ky.	L15fH 100	Oct. 11		19.5	2.2	23.9	4.9	240	7.4	43	177	209
Hinkston Creek 300 ft. below last sew. outlet Millersburg, Ky.	L15fH 99	Oct. 11		17.5	1.2	12.9	5.9	1,100	7.4	9	172	196
Hinkston Creek 1 mile Below Millersburg, Ky.	L15fH 98	Sept. 13		21.5	3.9	43.5	3.9	240	7.6	20	143	
" "	" "	" 15		24.5	2.7	31.6	2.5	43	7.5	15	147	
" "	" "	" 18		20.5	1.9	20.7	2.5	4	7.4	13	148	
" "	" "	" 20		21.5	2.0	22.0	2.8	4	7.4	22	152	
Brush Fork Cr. upper edge of Carlisle, Ky.	L15fB 108	Sept. 13		27.0	2.6	32.6	16.5	36	7.7	137	212	
Scrub Grass Creek Above Carlisle, Ky.	L15fBS 109	Sept. 15		21.5	3.4	38.7	16.2	12	8.4	76	181	
Brush Fork Creek ½ mi. Below Carlisle, Ky.	L15fB 107	Sept. 19		20.5	6.8	74.3	3.2	110	7.8	37	142	
" "	" "	Oct. 11		17.0	4.9	50.7	3.5	75	7.6	50	161	172
Brush Fork Creek 1 mi. Below Carlisle, Ky.	L15fB 106	Sept. 13		25.5	7.4	88.8	1.5	23	7.6	15	140	
" "	" "	" 15		24.5	3.2	37.5	2.6	8	7.6	27	147	
Stoner Creek-Above Dam N. Middletown, Ky.	L15fS 111	Sept. 14		25.5	5.4	65.3	0.1	15	7.8	25	148	
Strodes Creek edge of town above Winchester, Ky.	L15fS 121	Sept. 12		16.0	4.1	41.3	3.0	36	7.6	20	370	
" "	" "	" 14		22.0	2.7	30.7	4.3	110	7.6	20	364	
Strodes Creek 1 mile below Winchester, Ky.	L15fS 119	Sept. 12		19.5	3.8	41.0	8.4	24,000	7.7	35	349	
" "	" "	" 14		21.5	0.5	5.4	14.5	4,300	7.6	23	325	
" "	" "	" 19		20.0	0.0	00.0	42.2	24,000	7.2	110	110	
" "	" "	" 21		19.5	0.3	3.6	19.9	110,000	7.6	17	285	
" "	" "	" 22		14.0	0.5	5.2	18.3	46,000	7.6	25	311	
Strodes Creek 4 miles Below Winchester, Ky.	L15fS 116	Sept. 21		19.0	3.4	35.9	3.1	36	7.6	20	211	
" "	" "	" 22		17.0	3.6	36.4	3.1	4	7.6	22	218	
Stoner Creek Power Plt. Above Paris, Ky.	L15fSt 100	Sept. 12		24.5	6.9	81.3	1.5	4	7.8	12	165	
" "	" "	" 14		20.0	7.0	76.0	1.4	9	7.8	13	162	
" "	" "	" 19		23.0	6.2	71.3	2.4	2	7.8	13	165	
Stoner Creek 200 Yds. bel. sewage-Paris, Ky.	L15fSt 98.5	Sept. 20		24.5	0.0	00.0	51.4	46,000	7.4	54	234	
" "	" "	" 21		23.5	0.0	00.0	42.2	46,000	7.5	66	240	
" "	" "	" 22		22.0	0.0	00.0	41.2	46,000	7.4	51	236	
Stoner Creek ½ mi. bel. sewage - Paris, Ky.	L15fSt 98.2	Sept. 12		20.5	5.1	55.7	5.3	36	7.8	30	191	
" "	" "	" 14		22.0	3.3	36.9	4.1	4	7.7	15	187	
Stoner Creek 1 mi. bel. sewage - Paris, Ky.	L15fSt 97.5	Sept. 19		21.5	1.4	15.7	7.5	24	7.6	13	211	

TABLE L-7 LICKING RIVER BASIN

OHIO RIVER POLLUTION SURVEY
LABORATORY DATA

SUMMARY OF INDIVIDUAL RESULTS

Sampling Point	Mileage From Mouth		Date 1939	Average Discharge c.f.s.	Temp. °C	Dissolved Oxygen		5 Day B.O.D. p.p.m.	Coliform M.P.N. Per ml	pH	Turbidity p.p.m.	Alkalinity p.p.m.	Hardness p.p.m.
						p.p.m.	% Sat.						
S.Fk. Licking River at lower bridge Above Lair, Kentucky	L18f	89	Sept. 13	5	21.5	5.4	61.1	2.2	4	7.9	76	154	
" "	"	"	" 15	5	24.0	5.8	67.4	1.8	9	7.9	41	154	
S.Fk. Licking River 1 mile below Lair, Ky.	L18f	88	Sept. 13	5	24.5	6.7	79.3	1.6	3	7.8	76	151	
" "	"	"	" 15	5	24.0	6.4	74.6	1.9	12	7.8	56	154	
" "	"	"	" 18		23.5	5.9	68.6	2.7	9	7.8	90	156	
S.Fk. Licking R. 1 mi. Above Cynthiana, Ky.	L18f	82	Sept. 15	5	25.5	7.3	87.6	2.2	15	8.0	33	155	
" "	"	"	" 18	5	24.5	7.1	83.8	4.1	4	7.9	49	161	
" "	"	"	" 20	5	21.0	5.0	56.1	4.7	4	7.9	55	158	
S.Fk. Licking R. upper edge Cynthiana, Ky.	L18f	81.5	Sept. 13	5	22.0	4.2	48.0	1.5	23	7.6	39	165	
" "	"	"	Oct. 11	5	19.5	4.4	47.8	2.8	46	7.6	15	182	210
S.Fk. Licking R. 1 mile Below Cynthiana, Ky.	L18f	80	Sept. 13	5	24.0	9.5	111.1	4.4	7	8.2	33	144	
" "	"	"	" 15		25.3	12.7	152.1	3.0	2	8.6	22	143	
" "	"	"	Oct. 11	5	20.5	1.6	17.1	24.5	930	7.4	44	158	180
S.Fk.Licking R. 1½ mi. below Cynthiana, Ky.	L18f	79.5	Sept. 18	4	24.0	9.3	108.8	5.8	1	8.1	20	153	
" "	"	"	" 20	4	21.5	6.1	68.0	2.7	24	7.9	37	150	
S.Fk.Licking R. Bridge in Town Cynthiana, Ky.	L18f	81	Feb. 17		6.5	11.6	94.5	1.6	240				
" "	"	"	" 24		4.5	12.4	95.4	1.1	93				
" "	"	"	Mar. 1		7.0	11.0	90.0	2.7	75				
" "	"	"	" 6		9.5	9.8	85.9	3.1	93				
" "	"	"	" 14		10.5	10.1	90.4	1.6	43				
" "	"	"	" 22		11.0	11.2	101.4	1.2	7				
" "	"	"	" 30		10.0	10.4	92.1	3.8	240				
" "	"	"	Apr. 5		10.5	10.6	94.5	1.2	24				
" "	"	"	" 11		12.0	10.1	93.1	1.0	9				
" "	"	"	" 21		11.0	10.4	93.8	0.4	93				
" "	"	"	" 27		19.0	8.8	94.7	0.7	4				
" "	"	"	May 3		15.5	9.6	95.7	1.3	24				
" "	"	"	" 9		18.5	10.0	105.6	3.9	46				
" "	"	"	" 17		19.0	10.7	114.8	4.5	4				
" "	"	"	" 25		26.0	7.0	85.8	2.4	24				
" "	"	"	" 31		26.0	5.3	64.8	4.0	240				
" "	"	"	June 6		24.5	8.8	104.7	4.0	460				
" "	"	"	" 12		23.0	6.6	76.5	1.8	43				
S. Fork Licking R. Berry, Kentucky	L18f	69	Sept. 20	4	21.0	6.8	75.8	2.2	9	7.8	50	133	
S.Fk.Licking R. Bridge on U.S. 27 Above Falmouth, Ky.	L18f	52	Feb. 17		7.5	11.6	96.8	5.2	93				
" "	"	"	" 24		5.5	12.8	101.1	1.5	43				
" "	"	"	Mar. 1		7.0	11.6	94.9	1.7	43				
" "	"	"	" 6		9.0	10.4	90.2	3.3	93				
" "	"	"	" 14		11.0	10.7	96.3	2.3	23				
" "	"	"	" 22		10.0	11.4	100.7	0.8	4				

TABLE L-7 LICKING RIVER BASIN

OHIO RIVER POLLUTION SURVEY
LABORATORY DATA

SUMMARY OF INDIVIDUAL RESULTS

Sampling Point	Mileage From Mouth	Date 1939	Average Discharge c.f.s.	Temp. °C	Dissolved Oxygen p.p.m.	Dissolved Oxygen % Sat.	5 Day B.O.D. p.p.m.	C[illegible]	pH	Turbidity p.p.m.	Alkalinity p.p.m.	Hardness p.p.m.
S.Fk.Licking R. bridge on U.S. 27 Above Falmouth, Ky.	LiSF 52	Mar. 30		9.0	10.7	92.4	3.1	[illegible]20				
" "	" "	Apr. 5		9.0	11.0	94.8	1.5	110				
" "	" "	" 11		11.0	10.4	93.4	1.6	93				
" "	" "	" 21		11.0	10.5	94.4	1.4	93				
" "	" "	" 27		18.5	8.6	91.4	1.3	43				
" "	" "	May 3		15.5	13.2	131.8	4.8	4				
" "	" "	" 9		19.5	8.8	94.8	2.1	2				
" "	" "	" 17		20.0	9.6	105.1	2.5	4				
" "	" "	" 25		25.5	7.0	84.1	1.6	24				
" "	" "	" 31		27.5	8.7	109.3	3.3	2				
" "	" "	June 6		24.0	7.5	87.7	2.0	24				
" "	" "	" 12		21.5	6.9	77.7	3.1	240				
" "	" "	" 26		None	7.4		1.8	240				
" "	" "	July 10		25.0	7.3	87.1	2.0	460				
" "	" "	" 24		26.5	7.5	92.1	1.8	24				
" "	" "	Aug. 7		23.5	7.2	83.6	1.5	46				
" "	" "	Aug. 21		24.5	7.0	82.6	1.2	460	7.8			
" "	" "	Sept. 18	29	20.0	7.1	77.1	1.1	24	7.8			
" "	" "	Oct. 16	27	10.0	10.2	90.0	1.2	15	8.0			
" "	" "	Nov. 13	24	5.0	11.3	88.0	1.2	9	7.6			
" "	" "	Dec. 22		0.0	13.3	91.1	0.9	4	7.7			
" "	" "	1940 Jan. 16		0.0	13.8	94.4	3.7	1,100	7.6			
" "	" "	" 29		0.0	13.6	93.3	1.3	4	7.6			
" "	" "	Feb. 6		1.0	13.1	92.2	6.2	150	7.5			
" "	" "	" 14		4.5	12.5	96.3	1.5	43	7.5			
" "	" "	" 20		7.0	11.6	95.6	2.2	29	7.5			
" "	" "	" 27		6.0	12.8	102.7	1.1	15	7.5			
" "	" "	Mar. 4		11.0	9.8	88.4	3.2	460	7.5			
" "	" "	" 8		6.0	11.9	95.4	0.9	23	7.6			
" "	" "	" 14		5.0	12.2	95.4	0.8	9	7.7			
" "	" "	" 21		10.0	12.3	108.4	0.7	4	7.9			
" "	" "	" 29		12.0	10.9	100.9	0.9	1	8.2			
Licking River-bridge Kentucky Rte. 022 Above Falmouth, Ky.	Li 51	Feb. 17		8.0	11.5	96.6	2.4	23				
" "	" "	" 24		5.5	11.8	93.8	1.3	4				
" "	" "	Mar. 1		7.0	11.5	94.2	1.3	23				
" "	" "	" 6		8.5	10.5	89.8	3.1	93				
" "	" "	" 14		11.5	10.4	94.4	1.6	93				
" "	" "	" 22		9.5	11.5	100.6	0.7	3				
" "	" "	" 30		10.0	10.6	93.9	2.2	43				
" "	" "	Apr. 5		10.0	11.0	96.6	1.0	110				
" "	" "	" 11		11.5	11.0	100.0	0.8	9				
" "	" "	" 21		12.0	9.9	91.7	1.0	23				
" "	" "	" 27		18.0	8.7	91.1	1.2	93				
" "	" "	May 3		15.5	9.6	95.0	1.0	15				
" "	" "	" 9		19.0	9.7	103.5	1.8	4				
" "	" "	" 17		20.5	9.3	102.1	1.7	2				
" "	" "	" 25		25.5	7.1	85.2	1.7	5				
" "	" "	" 31		26.5	6.6	81.3	1.6	24				

TABLE L-7 LICKING RIVER BASIN

OHIO RIVER POLLUTION SURVEY
LABORATORY DATA

SUMMARY OF INDIVIDUAL RESULTS

Sampling Point	Mileage From Mouth	Date 1939	Average Discharge c.f.s.	Temp. °C	Dissolved Oxygen p.p.m.	Dissolved Oxygen % Sat.	5 Day B.O.D. p.p.m.	Coliforms M.P.N. Per ml	pH	Turbidity p.p.m.	Alkalinity p.p.m.	Hardness p.p.m.
Licking River-Bridge on [illegible] route # 22 Abv. Falmouth, Ky.	Li 51	June 6		25.0	6.9	82.1	1.3	15				
" "	" "	" 12		22.5	7.0	79.7	2.2	460				
Licking River - Above sewers-Abv. Falmouth, Ky.	Li 51.5	June 26	1,080	None	7.3	—	3.4	110				
" "	" "	July 10		25.0	5.3	63.7	4.2	460				
" "	" "	" 24		26.0	7.4	90.4	0.8	46				
" "	" "	Aug. 7		24.0	7.2	85.0	0.8	46				
" "	" "	" 21		24.0	6.2	72.8	1.4	240	7.6			
" "	" "	Sept.18	56	23.5	8.2	95.0	2.1	4	8.0			
" "	" "	Oct. 16	44	12.0	9.8	90.5	1.6	5	7.9			
" "	" "	Nov. 13	51	6.0	11.6	92.6	1.4	2	7.5			
" "	" "	Dec. 22		1.0	13.0	91.0	1.7	2	7.5			
" "	" "	1940 Jan. 16		0.0	13.8	94.2	2.6	46	7.7			
" "	" "	" 29		0.0	13.8	94.4	2.2	9	7.6			
" "	" "	Feb. 6		0.0	13.0	89.1	2.4	21	7.5			
" "	" "	" 14		1.5	12.5	88.9	1.8	23	7.5			
" "	" "	Feb. 20		6.0	11.1	89.0	1.8	23	7.5			
" "	" "	" 27		7.0	12.7	104.5	1.1	9	7.8			
" "	" "	Mar. 4		10.0	10.3	90.9	3.0	240	7.5			
" "	" "	" 8		6.0	11.4	95.7	0.9	43	7.5			
" "	" "	" 14		5.0	12.4	96.6	1.9	2	7.6			
" "	" "	" 21		10.5	11.2	100.1	0.8	3	7.8			
" "	" "	" 29		11.0	11.4	102.9	0.4	2	7.6			
Licking River - below Falmouth, Ky.	Li 49.4	1939 June 26	2,400	None	7.4	—	2.0	110				
" "	" "	July 10		25.0	6.2	73.6	2.4	460				
" "	" "	" 24		25.5	7.4	89.2	1.7	110				
" "	" "	Aug. 7		23.5	7.1	82.6	1.4	150				
" "	" "	" 21		24.5	6.4	75.5	1.6	460	7.5			
" "	" "	Sept.18	55	22.5	8.0	91.4	1.9	110	7.9			
" "	" "	Oct. 16	50	11.5	9.9	90.5	1.5	1,100	7.9			
" "	" "	Nov. 13	80	5.5	11.5	91.2	1.3	43	7.5			
" "	" "	Dec. 22		1.0	None	—	1.5	93	7.5			
" "	" "	1940 Jan. 29		0.0	13.8	94.2	5.0	110	7.5			
" "	" "	Feb. 6		0.0	13.2	90.1	4.8	43	7.5			
Licking River Bridge U.S. Rte. #27 Butler, Ky.	Li 35	1939 Feb. 17	29,600	7.5	11.6	96.4	2.5	20				
" "	" "	" 24	6,770	5.5	12.0	94.9	1.3	9				
" "	" "	Mar. 1	17,375	6.0	11.5	91.9	1.8	43				
" "	" "	" 6	46,000	8.5	10.6	90.3	3.3	240				
" "	" "	" 14	21,000	10.5	10.3	91.8	1.8	23				
" "	" "	" 22	2,650	9.5	11.5	100.1	1.0	4	7.7	36	93	
" "	" "	" 30	13,810	9.5	10.6	92.2	3.1	93	7.6	950	81	
" "	" "	Apr. 5	8,260	9.5	11.0	96.0	1.0	46	7.6	100	75	
" "	" "	" 11	7,060	11.0	10.7	96.8	0.7	15	7.8	100	77	
" "	" "	" 21	20,200	11.5	9.5	90.6	1.1	43	8.0	180	59	
" "	" "	" 27	3,680	17.0	9.0	92.2	1.0	9	7.6	41	100	

TABLE L-7 LICKING RIVER BASIN

OHIO RIVER POLLUTION SURVEY
LABORATORY DATA

SUMMARY OF INDIVIDUAL RESULTS

Sampling Point	Mileage from Mouth	Date 1939	Average Discharge c.f.s.	Temp. °C	Dissolved Oxygen p.p.m.	Dissolved Oxygen % Sat.	5 Day B.O.D. p.p.m.	Coliform M.P.N. Per ml.	pH	Turbidity p.p.m.	Alkalinity p.p.m.	Hardness p.p.m.
Licking River - Bridge on U.S. Rte. #27 Nr. [illegible], Kentucky	Li 35	May 3	2,025	14.5	9.8	95.9	1.8	15	7.8	40	93	
" "	" "	" 9	1,170	20.0	8.9	97.1	2.1	8	8.3	15	95	
" "	" "	" 17	795	18.5	8.7	92.6	1.7	2	8.1	5	99	
" "	" "	" 25	1,360	25.0	7.8	92.8	1.8	24	7.7	43	96	
" "	" "	" 31	980	26.5	8.0	97.9	1.4	24	7.8	25	74	
" "	" "	June 6	1,120	25.0	7.1	85.0	1.9	24	7.7	162	106	
" "	" "	" 12	3,630	22.0	6.4	72.3	3.2	240	7.7	825	82	
" "	" "	1940 Feb. 20	26,800	7.0	12.0	98.4	2.2	240	7.5			
" "	" "	" 27	3,100	7.5	12.9	107.6	0.9	23	7.6			
" "	" "	Mar. 4	50,400	10.0	10.1	89.3	3.2	93	7.5			
" "	" "	" 8	8,800	7.0	11.4	93.9	1.0	93	7.5			
" "	" "	" 14	2,300	4.5	12.3	94.9	0.9	8	7.6			
" "	" "	" 21	2,920	8.0	11.4	95.6	0.9	15	7.8			
" "	" "	" 29	1,360	13.0	11.2	105.8	0.6	9	7.6			
Licking River - L. & N. R. R. Bridge Latonia, Ky.	Li 3.3	Apr. 5	9,000	10.0	10.8	94.9	1.1	460				
" "	" "	" 11	7,690	11.5	10.6	96.7	1.5	210				
" "	" "	" 21	2,200	12.5	9.5	88.8	1.2	23				
" "	" "	" 27	4,000	17.5	8.9	91.9	0.8	23				
" "	" "	May 3	2,200	15.5	9.7	96.7	1.8	150				
" "	" "	" 9	1,270	20.0	8.9	96.7	2.5	43				
" "	" "	" 17	865	21.0	8.6	95.9	2.0	110				
" "	" "	" 25	1,480	26.5	7.1	87.2	2.1	1,100				
" "	" "	" 31	1,070	25.0	7.0	83.5	1.6	23				
" "	" "	June 6	1,220	23.5	6.6	76.2	2.3	110				
" "	" "	" 12	3,950	23.5	6.2	72.6	3.0	460				
Licking River-Above Banklick Creek Above Latonia, Ky.	Li 5.5	June 26	2,630	None	6.8	—	2.0	460	7.8	550	94	
" "	" "	July 10	26,800	24.0	5.5	64.0	2.9	460				
" "	" "	" 24	1,380	24.0	7.2	84.5	1.4	9				
" "	" "	Aug. 7	1,620	23.5	6.7	78.1	1.6	46				
" "	" "	Aug. 21	2,410	24.0	6.2	72.7	1.5	43	7.5			
" "	" "	Sept. 11	141	21.5	6.5	73.0	1.6	7				
" "	" "	" 18	109	23.0	6.6	75.8	1.2	2	7.8			
" "	" "	Oct. 9	64	19.0	8.0	85.9	1.8	2	7.9			
" "	" "	" 16	58	12.5	8.0	74.4	1.2	5	7.6			
" "	" "	Nov. 6	192	6.0	11.3	90.5	1.0	4	7.7			
" "	" "	" 13	99	5.0	11.5	89.8	1.2	4	7.5			
" "	" "	Dec. 15	127	2.5	12.3	90.3	2.6	9	7.6			
" "	" "	" 22	130	1.5	12.2	86.7	1.5	9	7.6			
" "	" "	1940 Jan. 16	4,950	0.0	13.1	89.3	4.4	110	7.7			
" "	" "	" 29	460	0.0	13.8	94.7	3.1	4	7.[illegible]			
" "	" "	Feb. 6	4,200	1.0	13.2	93.0	6.6	240	7.5			
" "	" "	" 14	7,150	2.5	12.2	89.3	2.2	43	7.5			
" "	" "	" 20	29,200	5.0	12.1	94.8	2.4	93	7.5			
" "	" "	Mar. 4	54,900	8.0	10.1	84.9	3.1	93	7.5			
" "	" "	" 8	9,580	7.0	11.3	92.8	1.0	23	7.5			

TABLE L-7 LICKING RIVER BASIN

OHIO RIVER POLLUTION SURVEY
LABORATORY DATA

SUMMARY OF INDIVIDUAL RESULTS

Sampling Point	Mileage From Mouth	Date 1940	Average Discharge c.f.s.	Temp. °C	Dissolved Oxygen		5 Day B.O.D. p.p.m.	Coliforms M.P.N. Per ml.	pH	Turbidity p.p.m.	Alkalinity p.p.m.	Hardness p.p.m.
					p.p.m.	% Sat.						
Licking River - Above Banklick Creek, Above Latonia, Ky.	Li 5.5	Mar. 14	2,500	5.0	12.2	95.5	1.2	12	7.6			
" "	" "	" 21	3,180	7.5	11.2	93.5	1.4	4	7.9			
" "	" "	" 29	1,480	10.5	11.3	101.1	0.9	4	7.6			
Licking River - Mouth Newport, Kentucky	Li 0.4	1939 Feb. 24	7,370	6.0	11.7	93.5	1.6	150				
" "	" "	Mar. 1	18,900	7.0	11.6	94.9	2.2	93				
" "	" "	" 6	52,300	8.5	10.6	90.0	3.2	240				
" "	" "	" 14	22,900	12.0	10.0	92.7	2.7	93				
" "	" "	" 30	15,000	9.5	10.4	91.2	3.8	240				
" "	" "	1940 Jan. 16	4,950	0.0	12.9	88.2	18.7	460	7.6			
" "	" "	" 29	460	0.0	13.0	88.9	5.5	240	7.6			
" "	" "	Feb. 6	4,200	2.0	11.4	82.2	10.1	1,100	6.8			
" "	" "	" 14	7,150	4.5	12.2	94.4	2.0	240	7.5			
" "	" "	" 20	29,200	7.5	12.1	100.3	2.5	240	7.5			
" "	" "	" 27	3,370	5.0	12.7	99.5	2.7	460	7.5			
" "	" "	Mar. 4	54,900	8.0	9.8	82.9	2.9	93	7.5			
" "	" "	" 8	9,580	9.0	11.1	95.9	1.5	1,100	7.5			
" "	" "	" 14	2,500	5.0	12.2	95.1	1.5	1,100	7.6			
" "	" "	" 21	3,180	11.0	11.0	99.5	1.3	240	7.7			
" "	" "	" 29	1,480	13.0	11.2	105.7	2.2	240	7.5			

SALT RIVER BASIN

Final Report to the Ohio River Committee

Ohio River Pollution Survey

U. S. Public Health Service
Cincinnati, Ohio
1942

SALT RIVER BASIN

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SALT RIVER BASIN*

Syllabus and Conclusions

Syllabus

The Salt River Basin comprises 2,890 square miles of the Bluegrass section in the north central part of Kentucky. The population of nearly 140,000 is predominantly rural, only 16,000 people living in the four towns of more than 2,500 population. All but one of the larger communities have sewage treatment plants. The most serious pollution problems are caused by wastes from the 24 distilleries. Although all of these have taken some steps to reduce the quantity and strength of their wastes, further corrective measures appear justified for the protection of aquatic life.

Conclusions

(1) Of 17 public water supplies, 15, serving 26,500 people, are from surface sources. Pollution is a minor problem in connection with these supplies.

(2) Sewage from about 20,300 people is discharged to the streams of the basin. About 85 percent of sewage is treated prior to discharge. Industrial wastes with a population equivalent of about 99,000 also reach the streams. Almost all of this waste is from distilleries.

(3) Laboratory observations show that the Salt River and its principal tributaries are not seriously polluted except immediately below the larger sources of pollution. The streams seem to recover rather quickly from the pollutional loads placed on them. Practically no distillery wastes were being discharged at the time of sampling.

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* For maps of this basin, see Kentucky River Basin.

(4) The limited records available indicate the following minimum flows:

Salt River at Shepherdsville	0.4 c.f.s.
Rolling Fork at Boston	16. "
Beech Fork at Fredericktown	None

(5) Very little of the waste enters the larger streams directly. Most of the communities and industries are located on small tributaries which afford practically no dilution.

(6) All but one of the sewage treatment plants in the basin provide secondary treatment. Such treatment everywhere is indicated because of the lack of appreciable dilution

(7) Treatment of distillery wastes by evaporation of the slop and ponding or broad irrigation of other wastes is needed at the larger plants. At others, improved ponding or irrigation facilities probably will suffice.

(8) The estimated cost of remedial measures as summarized from Table St-1 follows:

Treatment	Capital Cost	Annual Cost
Existing	$670,000	$80,000
Suggested additional	460,000	70,000

Estimated additional costs, over existing charges, of programs involving uniform treatment throughout the basin are:

Primary, all places	380,000	60,000
Secondary, all places	460,000	70,000

Table St-1 Salt River Basin - Estimated Cost of Existing and Suggested Minimum Corrective Measures for Sewage and Industrial Wastes, with Comparative Costs for Primary and Secondary Treatment.

	Number of Plants		Population Connected to Sewers	Capital Investment (Dollars)	Annual Charges (Dollars)		
	Prim.	Sec.			Amort. & Interest	Operation & Main.	Total
Existing Sewage Treatment	1	7	17,100	670,000	48,000	32,000	80,000
Suggested Minimum Correction							
Sewage Treatment Plants	0	7	3,200	200,000	14,000	10,000	24,000
Required Interceptors			-	10,000	1,000	-	1,000
Independent Industrial Waste Correction	-		-	250,000	41,000	4,000	45,000
Total				460,000	56,000	14,000	70,000
Comparative Cost							
Primary Treatment all Waste				380,000	50,000	10,000	60,000
Secondary Treatment all Waste				460,000	56,000	14,000	70,000
As Suggested				460,000	56,000	14,000	70,000

Description

The Salt River Basin comprises 2,890 square miles of rolling land in north central Kentucky, most of which is the fertile agricultural land of the Bluegrass section. The Salt River joins the Ohio at West Point, Kentucky, about 25 miles below Louisville.

Major Tributaries	Distance above Mouth	Drainage Area Square Miles
Rolling Fork (Incl.Beech Fk.)	12	1,470
Beech Fork	29	776
Floyds Fork	24	262

Urban Communities	Populations			
	1910	1920	1930	1940
Harrodsburg	3,147	3,765	4,029	4,673
Shelbyville	3,412	3,760	4,033	4,392
Lebanon	3,077	3,239	3,248	3,786
Bardstown	2,126	1,717	1,767	3,152
Entire Basin				
Urban	9,636	10,764	11,310	16,003
Rural	118,059	121,268	114,852	123,865
Total	127,695	132,032	126,162	139,868

Agriculture and whiskey distilling are the principal industries of the area. Most of the 24 distilleries are small and are located in rural areas.

Water Uses - The Salt River is not navigable except near the mouth where it is influenced by backwater from the Ohio River. There are no flood-control or hydroelectric reservoirs in the basin. The lack of important towns along the larger streams lessens the need for flood control, and no reservoirs have been authorized. Many of the streams are used by local residents for fishing and bathing but the streams are not particularly attractive for recreation because of the extreme low flows which usually prevail during the summer.

Presentation of Field Data

Figure Ky-1 shows the location and magnitude of each source of pollution of consequence in the basin. Figure Kt-2 shows similar data and, in addition, the location of water supply intakes from streams below sources of pollution and laboratory data on coliform organisms, dissolved oxygen and B.O.D.

Public Water Supplies - All but two of the 17 public water supplies in the basin come from surface sources. The two underground supplies serve only 600 people while the surface supplies serve 26,500. Five of the surface supplies are from streams below sources of pollution while the other 10 are from small impounding reservoirs or from streams above the point of entrance of any sewage. Table Kt-2 shows data on the surface water supplies of the basin.

Sewerage - Table Kt-3 shows the sewered population at each of the more important sources of pollution. All but 3,200 of the 20,300 people connected to sewers are served by sewage treatment plants.

Industrial Wastes - All of the 29 waste producing industrial plants in the basin have taken some steps to reduce the strength or amount of their wastes. Table Kt-4 shows data on the various sources of industrial wastes.

None of the distilleries operate throughout the year. Most of them commence operation in October or November and continue throughout winter and spring. Since these are the months during which temperatures are low and stream flows high, the waste from the distilleries do not cause as serious pollution as if they operated throughout the summer months. Nevertheless they present the outstanding pollution problem of the basin.

Table St-2 Salt River Basin - Surface Water Supplies

Supply	Source	Mile (1)	Treatment (2)	Population Served	Consumption M.G.D.
Supplies Below Community Sewer Outfalls					
Shepherdsville	Salt River	25	FD	500	0.02
Taylorsville	" "	57	FD	900	0.06
Lawrenceburg	" "	91	FD	2,100	0.25
Lebanon Jct.	Rolling Fork	23	FD	500	0.02
New Haven	" "	45	FD	300	0.01
Other Surface Supplies					
Lebanon	Rolling Fork	87	FD	3,500	0.18
Bradfordville	N.Fk.Rolling Fk. (Infiltration gallery)	95	None	200	0.01
Shelbyville	Clear Cr.-Impounded	89	FD	4,000	0.29
Fort Knox	Mill Cr.-Otter Creek	15	FD	5,000	0.70
Harrodsburg	Salt River	122	FD	4,500	0.14
Bardstown	Impounded	-	FD	2,500	0.22
Springfield	"	-	FD	1,600	0.09
Lincoln Inst.	"	-	FD	300	0.03
Nazareth Col.	"	-	F	400	0.02
St.Catherines Academy	" (3)	-	0	200	0.02
Total - Below Sewer Outfalls				4,300	0.36
Other				22,200	1.70
Total - Surface Water Supplies				26,500	2.06

(1) Miles above mouth of Salt River.
(2) F - Coagulated, settled, filtered, D - Chlorinated.
(3) For inferior purposes only.

Table St-3 Salt River Basin - Sources of Pollution, Including Industrial Wastes, Expressed as Sewered Population Equivalent (B.O.D.)

Municipality	Stream	Miles above Mouth of Salt R.	Population Connected to Sewers	Treatment	Sewered Population Equivalent (B.O.D.)	
					Untreated	Discharged
Valley Station	Pond Creek	4	- (1)	-	1,700	1,700
Fort Knox	Mill Creek	12	5,000	Secondary	5,000	800
Lebanon Junction	Rolling Fk. Trib.	23	-	-	12,000	12,000
Athertonville	Knob Creek	46	-	-	14,000	14,000
Bardstown	Beech Fork	54	1,500	None	14,800	14,800
Lebanon	Hardins Creek	81	3,500	Secondary	8,000	4,700
Springfield	Road Run	80	1,100	"	1,500	600
Gethsemane	Pottinger Creek	50	-	-	3,500	3,500
Dant	" " So.Fk.	55	-	-	1,500	1,500
Loretto	Hardins Cr.-W. Fk. Prathers Creek	70	-	-	1,400	1,400
Clermont	Longlick Creek	26	-	-	20,000	20,000
Deatsville	Cane Run	47	- (2)	-	16,000	16,000
Nazareth College	Cox's Creek	53	400	Secondary	2,500	2,200
Fairfield	" " E. Fork	49	-	-	1,900	1,900
Taylorsville	Brashears Creek	57	800	None	1,100	1,100
Shelbyville	Clear Creek	88	3,200	Secondary	3,200	500
Lawrenceburg	Hammond Creek	96	1,500	"	7,700	6,400
Harrodsburg	Town Br. of Salt R.	123	1,700	Primary	1,800	1,200
6 smaller sources			1,600	Various	1,600	1,000
Total	-	-	20,300	-	119,200	105,300

(1) Conditions at time of survey in 1940. Population has since increased.
(2) Corrective measures being taken 1941. Figure represents conditions at time of survey.

Table St-4 Salt River Basin - Summary of Industrial Wastes not Discharging to Municipal Treatment Plants, with Total of Entire Industrial Waste Load in the Basin.

Industry	Number of Plants	Industrial Waste Disposal		At Least Minor Corrective Measures Taken	Estimated Sewered Population Equivalent (B.O.D.)
		Munic. Sewers	Private Outlets		
Milk	2	1	1	2	700
Distilleries	24	-	24	24	97,500
Miscellaneous	1	-	1	1	-
Waste Unconnected Munic. Treatment	27	1	26	27	98,200
Waste Connected to Municipal Treatment					700
Total Industrial Waste in Basin					98,900

FIG. 91-2

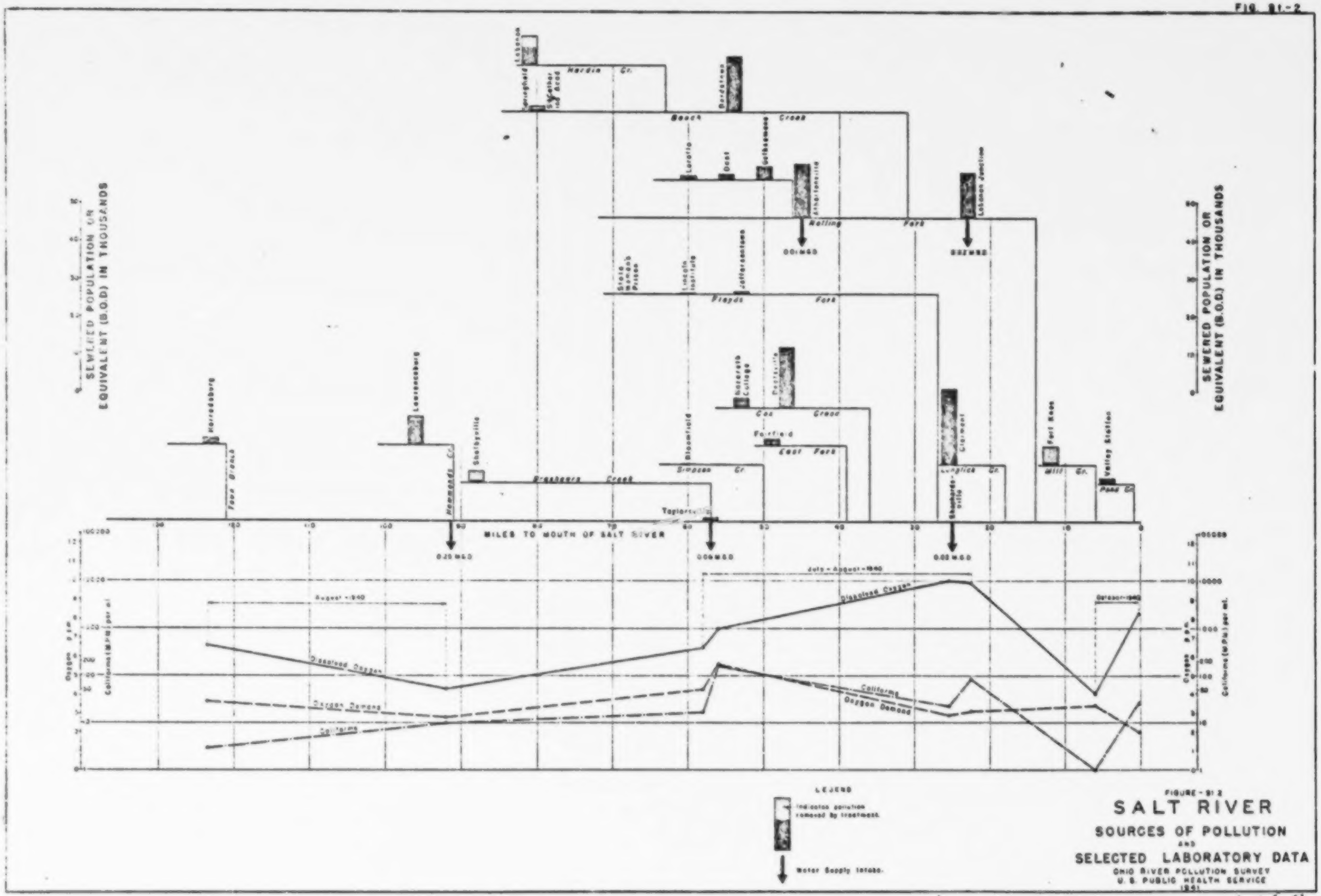

FIGURE - 91 2

SALT RIVER

SOURCES OF POLLUTION
AND
SELECTED LABORATORY DATA

OHIO RIVER POLLUTION SURVEY
U. S. PUBLIC HEALTH SERVICE
1941

644-H

Presentation of Laboratory Data

The laboratory results for the Salt River are presented in Table St-7. Selected data on the main stream and on tributaries are shown in Table St-5. The coliform, dissolved oxygen and oxygen demand results are shown graphically on the spot symbol maps in Figures Ky-3, Ky-4 and Ky-5, respectively. These represent averages of from one to three samples taken over short periods and represent the most unfavorable picture from a series of several such observations at the mouth.

All observations in the Salt River Basin, except at the mouth, were made by a mobile laboratory unit during July and August, 1940. Additional samples at the mouth and in the vicinity of Ft.Knox were taken by a mobile unit in August and October of 1940 and February of 1941. At the time of this survey, there were practically no distillery wastes entering the streams and streams flows were quite low.

From these laboratory data, it appears that the Salt River or its major tributaries are not seriously polluted except immediately below the larger sources of pollution. Lawrenceburg, Harrodsburg, Taylorsville and Shelbyville appear to be the worst points affecting the main stem.

Springfield, Lebanon and Bardstown on Beech Fork and its tributaries show bad local conditions below the towns. The Bardstown outfall sewer permits the discharged wastes to spread over the ground so that considerable recovery in dissolved oxygen and coliform reduction is probably achieved before the stream is reached.

High average coliform count of over 800 per ml. and an average D.O. content of about three p.p.m. was found at the mouth of Salt River in August, 1940. The effect of Ft. Knox sewage is shown by the results at the mouth of Mill Creek.

The Salt River and its main tributaries seem to recover rather quickly from the pollutional loads placed upon them. The data show generally good coliform counts of 25 per ml. or less above most towns on the larger streams, in contrast with fairly high counts below the towns next upstream. The dissolved oxygen generally is good with average values of 5 p.p.m. or more except immediately below sources of pollution. The average 5-day B.O.D. is generally less than 3 p.p.m. at the above stations and represents a considerable improvement over the values below the next upstream town.

Table St-5 Salt River Basin - Selected Laboratory Data

River Location	Salt R. abv. Harrodsburg	Salt R. abv. Lawrenceburg	Salt R. bel. Taylorsville	Salt R. bel. Shepherdsville	Salt R. above Mill Cr.	Salt R. at Mouth	Town Br. bel. Harrodsburg
River Miles Above:							
Mouth of Salt R.	123.5	92	56	22.5	6	0.1	122
Period - 1940	August	August	July-Aug.	July-Aug.	October	August	August
Number of Samples	3	3	3	3	2	3	3
Flow in c.f.s.:							
Sampling Days	*	*	15	15	23	246	1
Minimum Month	-	-	-	0.4	-	-	-
Water Temperature °C	24.3	23.7	30.0	27.7	15.5	27.7	23.5
Coliforms per ml.	3	10	161	88	*	845	45,000
Dissolved oxygen ppm.	6.6	4.3	7.5	9.9	4.0	3.5	0.0
B.O.D., 5-day, p.p.m.	3.6	2.8	5.6	3.1	3.4	2.0	19.0

River Location	Hammond Cr. below Lawrenceburg	Rolling Fork at Lebanon Waterworks	Rolling Fork at Boston	Road Run below Springfield	Beech F. below Bardstown	Hardins Cr. below Lebanon	Mill Cr. below Fort Knox
River Miles Above:							
Conf. with Salt R.	-	73.5	16.5	(1) 12	(2) 21	(1) -	5
Mouth of Salt R.	95	87.5	30.5	80	52	78.5	11
Period - 1940	August	August	August	August	August	August	August
Number of Samples	3	3	3	3	3	3	3
Flow in c.f.s.:							
Sampling Days	*	2	87	*	25	*	1
Minimum Month	-	-	16	-	-	-	-
Water Temperature °C	21.3	22.0	24.0	25.5	23.8	20.7	24.5
Coliforms per ml.	365	43	14	58,600	422	10,900	151
Dissolved oxygen ppm.	2.6	5.0	6.3	0.0	5.8	2.6	2.8
B.O.D., 5-day p.p.m.	7.9	1.6	1.9	104.0	2.2	13.0	9.0

* Less than one c.f.s. (1) Miles above confluence with Beech Fork.
(2) " " " " Rolling Fork.

Hydrometric Data

The only discharge record available in the basin prior to the beginning of this survey was on Beech Fork at Fredericktown, drainage area 530 square miles, (11 miles above Bardstown) where a station was maintained from October, 1930 to March, 1932. During the first part of the record zero flow prevailed and during the summer of 1931 the flow was less than 5 c.f.s. for a considerable period. During 1940 and 1941 two stream gaging stations have been maintained in connection with this survey, one on the Salt River at Shepherdsville (drainage area 1,210 square miles) and one on Rolling Fork at Boston (drainage area 1,300 square miles). During October, 1940 the flow at Shepherdsville averaged 0.4 c.f.s. and at Boston 16.0 c.f.s. As it is very brief, the entire record is presented on Table St-6.

Table St-6 Salt River Basin - Monthly Mean Flows at Gaging Stations for Years of Record.

River Location	Salt River Shepherdsville	Rolling Fk. at Boston	-	Beech Fork at Fredericktown
River Miles Above:				
Conf. with Salt R.	-	18		35
Mouth of Salt R.	25	31		65
Drain. Area Sq. Mi.	1210	1300		530
Year	1940	1940	1930	1930
July c.f.s.	275	496	October	0
August "	72	79	November	.1
September "	28	40	December	3.2
October "	0.4	16	1931	
November "	34	168	January	114
December "	409	719	February	2360
	1941	1941	March	4820
January "	1233	1088	April	4820
February "	323	335	May	325
March "	304	330	June	920
			July	510
			August	2090
			September	2360
			October	2730
			November	4300
			December	15300
			1932	
			January	17900
			February	6280
			March	13100

Discussion

Sewage pollution in the Salt Basin is not a serious problem. Bardstown is the only urban community without a sewage treatment plant, but local nuisances still exist at a few places. Three smaller communities and three small institutions either have no plants or very inadequate ones. At Harrodsburg the primary sewage treatment plant appears inadequate. Enlargement and addition of secondary treatment devices is indicated. At the smaller places secondary treatment may be needed to prevent local nuisances.

The milk plants can all be connected to municipal treatment plants. The distilleries, however, are not readily accessible to city sewers or discharge such large quantities of wastes that connection to municipal treatment plants is infeasible. Treatment facilities at a few of the distilleries are adequate at present but at most of them some additional corrective measures appear justified. These would include evaporation of all objectionable wastes at the larger plants and improved broad irrigation at smaller plants. Disposal of slop to farmers and to cattle feed may be satisfactory at small plants and at normal times but supplementary broad irrigation is needed for handling dilute wastes and emergency discharges. Broad irrigation must be located in rural areas and be carefully done to be reasonably effective. Ponding has not proved satisfactory even at small distilleries because of inadequate design and resulting overflows and breaks in dams, especially at times of heavy rains, and also because of the local nuisance created.

The estimated cost of these suggested remedial measures is summarized in Table St-1.

TABLE St-7 SALT RIVER BASIN

OHIO RIVER POLLUTION SURVEY
LABORATORY DATA

SUMMARY OF INDIVIDUAL RESULTS

Sampling Point	Mileage From Mouth	Date [illegible]	Average Discharge c.f.s.	Temp. °C	Dissolved Oxygen p.p.m.	Dissolved Oxygen % Sat.	5 Day B.O.D. p.p.m.	Coliform M.P.N. Per ml	pH	Turbidity p.p.m.	Alkalinity p.p.m.	Hardness p.p.m.
Salt River - Above Harrodsburg, Kentucky	St 123.5	Aug. 13	*	25.0	8.3	98.7	5.3	4	8.2	15	110	94
" "	" "	" 16	*	27.5	5.6	64.6	2.1	2	7.7	20	102	
" "	" "	" 20	*	21.0	5.8	64.1	3.4	1	7.7	10	110	
Town Branch-100 Yds.bel. sew. plant-Harrodsburg	StTb 122	Aug. 13	1	25.5	0.0	00.0	15.0	46,000	7.3	20	224	210
" "	" "	" 16	1	25.5	0.0	00.0	19.0	43,000	7.3	20	234	
" "	" "	" 20	1	21.0	0.0	00.0	25.6	43,000	7.3	25	226	
Salt River - Above Lawrenceburg, Kentucky	St 92	Aug. 13	2	25.5	4.5	53.7	4.2	4	7.7	30	138	114
" "	" "	" 16	2	25.0	5.9	70.0	2.2	2	7.7	25	124	
" "	" "	" 20	1	20.5	2.5	27.5	3.0	24	7.4	25	124	
Hammonds Creek - Below Lawrenceburg, Kentucky	StH 95	Aug. 13	*	23.0	2.0	23.0	11.8	910	7.5	50	248	214
" "	" "	" 16	*	23.0	2.3	26.8	5.6	91	7.4	55	240	
" "	" "	" 20	*	16.0	3.6	37.7	6.3	93	7.4	35	224	
Salt River-Above W.Wks. Taylorsville, Kentucky	St 58	July 29	12	30.0	4.9	63.8	3.3	4	8.2	30	137	
" "	" "	" 31	5	31.0	7.5	99.6	6.0	4	7.8	45	120	
" "	" "	Aug. 2	4	28.5	7.1	90.6	4.8	43	8.1	75	128	128
Clear Creek -W.Wks.Int. above Shelbyville, Ky.	StBC 89.5	July 29	*	30.0	2.6	34.3	8.5	4	7.6	45	113	
" "	" "	" 31	*	26.0	2.7	34.0	11.4	46	7.5	40	152	
" "	" "	Aug. 2	*	26.0	5.7	69.6	7.1	2	7.5	35	120	128
Clear Creek-Disposal Plt Shelbyville,Ky.Below	StBC 84	July 29	*	30.0	0.0	00.0	15.8	36	7.3	5	123	
" "	" "	" 31	*	28.0	7.1	90.2	8.8	4	7.7	50	124	
" "	" "	Aug. 2	*	24.0	3.9	45.5	6.6	4	7.5	10	144	140
Brashears Creek - Mouth Taylorsville,Kentucky	StB 56.5	July 29	12	30.0	8.7	114.5	7.1	11,000	7.8	70	151	
" "	" "	" 31	7	30.0	4.7	61.1	8.4	91	7.6	65	148	
" "	" "	Aug. 2	4	28.0	4.7	59.3	11.0	240	7.7	55	160	168
Salt River - 1½ miles below Taylorsville, Ky.	St 56	July 29	24	32.0	8.0	107.9	4.9	240	8.0	50	132	
" "	" "	" 31	12	30.5	6.9	91.3	4.8	150	7.7	65	144	
" "	" "	Aug. 2	8	27.5	7.6	94.9	7.2	93	8.0	75	146	148
Floyds Creek - Mouth near Shepherdsville,Ky.	StFf 28.5	July 30	6	29.0	4.6	59.2	4.4	36	7.7	50	148	
" "	" "	Aug. 1	4	27.0	4.7	58.2	6.0	23	7.7	55	150	
" "	" "	" 5	2	27.0	5.9	73.6	3.6	43	7.8	50	152	180
Salt R.-W.Wks.Intake Abv.Shepherdsville,Ky.	St 25.5	July 30	24	30.0	9.8	129.1	2.9	9	7.7	10	112	
" "	" "	Aug. 1	15	29.0	11.2	144.5	3.4	9	8.0	10	108	
" "	" "	" 5	5	28.0	8.8	111.7	2.4	46	7.7	20	116	116
Salt River - ½ mi.bel. Shepherdsville, Ky.	St 22.5	July 30	24	31.0	12.1	161.4	3.8	15	8.4	10	120	
" "	" "	Aug. 1	15	26.0	9.4	114.7	3.2	240	7.8	30	106	
" "	" "	" 5	5	26.0	8.1	98.3	2.3	9	7.6	15	112	130

TABLE St-7 SALT RIVER BASIN

OHIO RIVER POLLUTION SURVEY
LABORATORY DATA

SUMMARY OF INDIVIDUAL RESULTS

Sampling Point	Mileage From Mouth	Date 1940	Average Discharge c.f.s.	Temp. °C	Dissolved Oxygen p.p.m.	Dissolved Oxygen % Sat.	5 Day B.O.D. p.p.m.	Coliform M.P.N. Per ml	pH	Turbidity p.p.m.	Alkalinity p.p.m.	Hardness p.p.m.
Rolling Fork-Lebanon Water Works-Calvary, Ky.	StRf 87.5	Aug. 14	2	25.0	4.2	50.6	1.9	46	7.5	120	94	94
" "	" "	" 19	2	21.0	5.7	63.4	0.4	36	7.6	35	102	
" "	" "	" 21	1	20.0	4.9	53.4	2.6	46	7.7	45	104	
Rolling Fork-1 mi. bel. New Haven, Kentucky	StRf 45.5	Aug. 12	50	27.5	6.1	76.1	1.6	43	7.7	70	118	116
" "	" "	" 15	18	23.5	5.9	68.7	1.4	2,400	7.5	50	108	
" "	" "	" 22	8	17.0	6.7	69.2	0.8	23	7.6	35	120	
Road Run of Beech Fork Bel. Springfield, Ky.	StRfBfC 80	Aug. 13	*	26.5	0.0	00.0	119.	110,000	7.2	200	172	142
" "	" "	" 16	*	29.0	0.0	00.0	80.6	43,000	7.3	100	188	
" "	" "	" 20	*	21.0	0.0	00.0	112.	23,000	7.2	120	212	
Cartwrights Cr. Bridge St.#68-Springfield, Ky.	StRfBfC 75	Aug. 13	2	26.5	10.3	126.5	6.5	46	8.4	110	100	98
" "	" "	" 16	*	30.0	10.9	142.6	3.6	9	8.4	45	100	
" "	" "	" 20	*	22.5	8.6	98.4	6.1	4	8.1	45	114	
Beech Fork-Bridge St.68 Fredericktown, Ky.	StRfBf 68	Aug. 13	10	27.0	7.2	89.0	4.4	9	8.2	65	124	110
" "	" "	" 16	5	30.0	6.7	87.7	1.9	9	7.8	65	120	
" "	" "	" 20	4	23.0	6.1	70.3	1.2	46	7.7	85	120	
Hardings Creek - below Lebanon, Kentucky	StRfBfH 78.5	Aug. 14	*	24.5	4.8	56.2	9.8	4,600	7.7	30	234	188
" "	" "	" 19	*	20.0	0.0	00.0	17.8	24,000	7.4	20	294	
" "	" "	" 21	*	17.5	3.1	32.2	11.3	4,300	7.7	10	294	
Mill Creek-4 mi. east Bardstown, Kentucky	StRfBfM 60	Aug. 13	*	26.5	9.7	118.8	2.2	46	8.4	15	134	142
" "	" "	" 16	*	31.0	9.8	130.6	2.0	23	8.3	10	144	
" "	" "	" 20	*	23.5	9.6	11.9	1.5	9	8.4	5	152	
Beech Fork-1 mile from Bardstown - Rt. 31 E	StRfBf 52	Aug. 12	55	27.5	6.7	84.2	3.3	15	7.9	105	120	124
" "	" "	" 15	15	25.5	5.6	67.7	2.0	150	7.7	60	130	
" "	" "	" 22	6	18.5	4.9	52.2	1.4	1,100	7.6	110	134	
Rolling Fork-Bel. Beech Fork - Boston, Ky.	StRf 30.5	Aug. 12	171	27.5	6.2	77.1	3.5	8	7.7	90	120	116
" "	" "	" 15	63	24.5	6.0	70.8	1.4	24	7.5	45	124	
" "	" "	" 22	28	20.0	6.8	74.3	0.7	9	7.6	25	136	
Salt River - Above Mill Creek	St 6.0	Oct. 25		15.5	3.9	37.8	2.3	**	7.5	20	153	
" "	" "	" 26		15.5	4.0	40.0	4.6	1	7.6	180	150	
Mill Creek - below Fort Knox	StM 11.0	Aug. 1	1	24.0	3.8	45.1	1.9	120	7.7	40	210	
" "	" "	" 5	2	24.0	1.6	21.1	17.8	93	7.7	35	264	220
" "	" "	" 6	1	25.5	2.9	34.9	7.4	240	7.7	40	258	
Pond Creek Above Mouth	StP 1.0	Aug. 6		28.5	8.4	107.5	3.1	460	7.8	22	173	
" "	" "	" 8		26.5	5.1	65.6	2.6	1,100	7.7	44	164	128
" "	" "	" 12		27.5	8.7	108.8	3.6	9	7.8	23	160	
" "	" "	Oct. 19		16.0	8.8	88.7	2.9	43	7.7	18	85	

TABLE St-7 SALT RIVER BASIN

OHIO RIVER POLLUTION SURVEY
LABORATORY DATA

SUMMARY OF INDIVIDUAL RESULTS

Sampling Point	Mileage From Mouth	Date 1940	Average Discharge c.f.s.	Temp. °C	Dissolved Oxygen p.p.m.	Dissolved Oxygen % Sat.	5 Day B.O.D. p.p.m.	Coliform M.P.N. Per ml.	pH	Turbidity p.p.m.	Alkalinity p.p.m.	Hardness p.p.m.
Pond Creek Above Mouth	StP 1	Oct. 21		15.5	8.0	80.1	2.2	110	7.5	15	71	
"	" "	" 22		14.5	8.5	83.1	2.7	43	7.6	30	70	
"	" "	" 23		15.5	8.0	80.1	2.8	23	7.6	20	68	
"	" "	" 24		15.5	9.4	93.5	2.5	9	7.7	20	77	119
"	" "	1941 Feb. 6		3.5	11.8	88.7	2.1	4	7.6	51	118	
"	" "	" 7		2.0	11.8	85.1	2.6	4	7.7	40	120	130
"	" "	" 8		0.0	12.5	85.4	4.3	15	7.6	410	129	
"	" "	" 10		0.0	12.7	87.0	1.3	46	7.8	12	148	
"	" "	" 11		0.0	12.7	86.7	1.0	1	7.7	15	160	
Salt River At Mouth	St 0.1	1940 Aug. 6	99	28.5	3.7	47.6	2.3	2,400	7.5	23	130	
"	" "	" 8	421	28.5	3.9	49.9	1.2	43	7.6	65	140	124
"	" "	" 12	215	26.0	2.9	35.8	2.6	93	7.5	93	98	
"	" "	Oct. 19	22	17.0	8.6	88.2	2.1	15	7.7	18	74	
"	" "	" 21	22	15.5	8.2	81.4	2.0	24	7.5	15	71	
"	" "	Oct. 22	22	15.0	8.5	83.5	2.2	43	7.5	18	63	
"	" "	" 23	21	15.5	7.8	77.4	2.2	46	7.5	18	62	
"	" "	" 24	24	16.0	8.7	87.2	2.2	9	7.7	18	67	114
"	" "	1941 Feb. 6	949	4.0	12.7	96.9	1.1	39	7.7	18	163	
"	" "	" 7	821	2.0	12.6	90.8	1.0	9	7.8	15	170	186
"	" "	" 8	800	1.5	12.4	88.4	1.1	9	7.8	15	170	
"	" "	" 10	614	2.5	12.7	93.2	1.2	9	7.8	10	174	
"	" "	" 11	573	1.0	12.9	90.6	1.0	93	7.7	12	175	

* Less than one.

WABASH RIVER BASIN

Final Report to the Ohio River Committee

Ohio River Pollution Survey

U. S. Public Health Service
Cincinnati, Ohio
1942

WABASH RIVER BASIN

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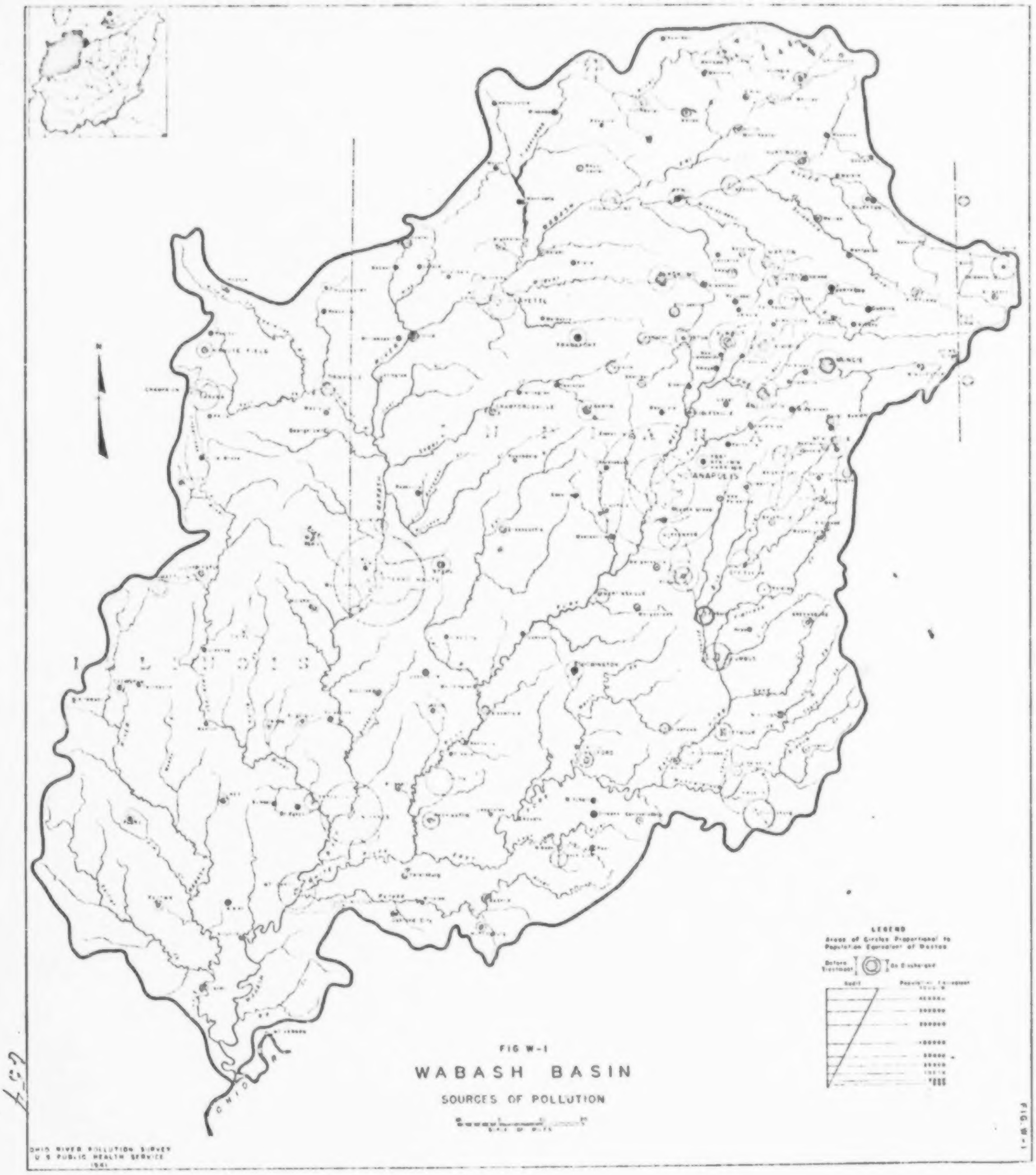

LEGEND
Areas of Circles Proportional to Population Equivalent of Wastes
Before Treatment
As Discharged
Population Equivalent
OHIO R
WABASH
MUNCIE
FIG. W-1

FIG W-1

WABASH BASIN

SOURCES OF POLLUTION

OHIO RIVER POLLUTION SURVEY
U S PUBLIC HEALTH SERVICE
1941

WABASH RIVER BASIN

Syllabus and Conclusions

Syllabus

The Wabash River drains 33,100 square miles, almost one-sixth of the entire Ohio Basin. A little less than half of the 2,500,000 people in the basin are in urban communities. Indianapolis (386,972) and Terre Haute (62,693) are the largest cities. Agriculture is the predominant occupation and the principal industries are concerned with the processing of agricultural products. Coal, oil and limestone are important mineral products.

Progress has been made toward the abatement of pollution and the sewage of almost three-quarters of the sewered population receives treatment. In spite of substantial progress toward the abatement of industrial pollution, these wastes cause the most serious problems at present.

Conclusions

(1) Forty-six of the 275 public water supplies in the basin are from surface sources. Thirty of these, serving 687,000 people, are from streams subject to pollution.

(2) About 1,120,000 persons are connected to sewers. The sewage of 73 percent receives treatment. Industrial wastes have a population equivalent of 1,772,000, of which 547,500 is discharged to municipal treatment plants.

(3) Laboratory studies indicate that the worst pollution problems are on the Wabash below Terre Haute, the West Fork of the White River below Indianapolis and the lower Muscatatuck River. In addition, many smaller streams are grossly polluted.

(4) The largest cities discharging untreated sewage are on the Wabash River. Partial treatment should be sufficient to maintain satisfactory conditions below Terre Haute and at other places on the Wabash from Logansport to the mouth.

(5) Secondary treatment will be required at most of the other communities such as Bedford, Columbus and Shelbyville. Additional treatment facilities and interceptors are needed at Indianapolis and improvements or additions to existing plants are indicated for Danville, Illinois, Franklin and Tipton, Indiana and other places.

(6) Canneries are the principal waste producing industries. Most of these will require relatively complete treatment.

(7) Low-flow augmentation by proposed flood-control reservoirs on Raccoon Creek and on the Embarrass River would be of minor value in abating pollution at Terre Haute and Lawrenceville, respectively.

(8) A summary of cost estimates of remedial measures from Table W-1 follows:

Treatment	Capital Cost	Annual Charges
Existing	$16,640,000	$1,600,000
Suggested additional	14,520,000	1,655,000

Estimated additional costs over existing charges of programs involving uniform treatment throughout the basin are:

Primary, all places	11,050,000	1,285,000
Secondary, all places	15,720,000	1,815,000

Table W-1 Wabash River Basin - Estimated Cost of Existing and Suggested Minimum Corrective Measures for Sewage and Industrial Wastes, with Comparative Costs for Primary and Secondary Treatment.

	Number of Plants		Population Connected to Sewers	Capital Investment (Dollars)	Annual Charges (Dollars)		
	Prim.	Sec.			Amort. & Interest	Operation & Main.	Total
Existing Sewage Treatment	10	74	822,000	16,640,000	1,020,000	560,000	1,600,000
Suggested Minimum Correction							
Sewage Treatment Plants	30	132	292,600	8,670,000	625,000	375,000	1,000,000
Required Interceptors			-	3,960,000	185,000	-	185,000
Independent Industrial Waste Correction				1,690,000	220,000	250,000	470,000
Total				14,520,000	1,030,000	625,000	1,655,000
Comparative Cost							
Primary Treatment All Waste				11,050,000	785,000	500,000	1,285,000
Secondary Treatment All Waste				15,720,000	1,115,000	700,000	1,815,000
As Suggested				14,520,000	1,030,000	625,000	1,655,000

Description

The Wabash River drains 33,100 square miles in Illinois, Indiana and Ohio. Almost three-quarters of the area is in Indiana, about one-quarter in Illinois and less than one percent in Ohio. The northern and central parts of the area are flat or gently rolling but in the southern portion the land is quite hilly. The principal tributaries of the Wabash are:

Tributary	Distance above Mouth of Wabash	Drainage Area Square Miles
Little Wabash River	15	3,380
Patoka River	95	850
White River	96	11,290
East Fork	147	5,680
West Fork	147	5,430
Embarrass River	122	2,350
Sugar Creek	245	840
Vermillion River	257	1,520
Wildcat Creek	317	800
Tippecanoe River	322	1,920
Eel River	354	850
Mississinewa River	375	890

The following tabulation of the population of some of the larger cities and of the entire basin shows the steady growth of most of the cities and the slow decrease in rural population until 1930. During the past ten years the urban growth has been much slower and rural population has increased.

Larger Cities	Populations			
	1910	1920	1930	1940
Indianapolis, Ind.	233,560	314,194	364,161	386,972
Terre Haute, Ind.	58,157	66,083	62,810	62,693
Muncie, Ind.	24,005	36,524	46,548	49,720
Anderson, Ind.	22,476	29,767	39,804	41,572
Champaign-Urbana, Ill.	20,666	26,117	33,408	37,366
Danville, Ill.	27,871	33,776	36,765	36,919
Kokomo, Ind.	17,010	30,067	32,843	33,795
Lafayette, Ind.	20,081	22,486	26,240	28,798
Marion, Ind.	19,359	23,747	24,496	26,767
Bloomington, Ind.	8,838	11,595	18,227	20,870
Logansport, Ind.	19,050	21,626	18,508	20,177
Vincennes, Ind.	14,895	17,160	17,564	18,228
New Castle, Ind.	9,446	14,458	14,027	16,620
Mattoon, Ill.	11,456	13,552	14,631	15,827
Entire Basin				
Rural	1,419,832	1,311,126	1,254,967	1,310,468
Urban	811,935	1,006,267	1,117,322	1,198,130
Total	2,231,767	2,317,393	2,372,289	2,508,598

The Wabash Basin is primarily an agricultural area and the principal industries are engaged in processing agricultural products (canneries, milk processing plants, meat packing plants, strawboard mills). There are an increasing number of machinery and metal products plants in the northern half of the basin. Coal is mined in the western part of the area in both Indiana and Illinois but production has been decreasing for some time. There are active oil fields in southern Illinois and in southwestern Indiana. The limestone quarries in the neighborhood of Bedford, Indiana furnish most of the fine-grained building and ornamental limestone in the country.

Water Uses - The Wabash River and its tributaries are not navigable for boats and barges of the size commonly used on the Ohio and its navigable tributaries. There are four hydroelectric power developments in the basin with an aggregate capacity of about 21,000 kilowatts. The two largest ones are on the Tippecanoe River, one near the mouth and the other a short distance above Monticello. The other developments, on the East Fork of White River at Williams and on the West Fork of White River at Noblesville, have capacities of about 3,200 and 500 kilowatts respectively. There are four known potential power sites, all of which would have small capacities totaling about 15,000 kilowatts.

The natural lakes in the northern part of the basin are used extensively for recreation as are the artificial lakes, particularly those at the power dams on the Tippecanoe River. There has been little commercial recreational development along the streams although they are used by local residents for fishing and swimming. There is some commercial fishing along the Wabash below New Harmony.

Presentation of Field Data

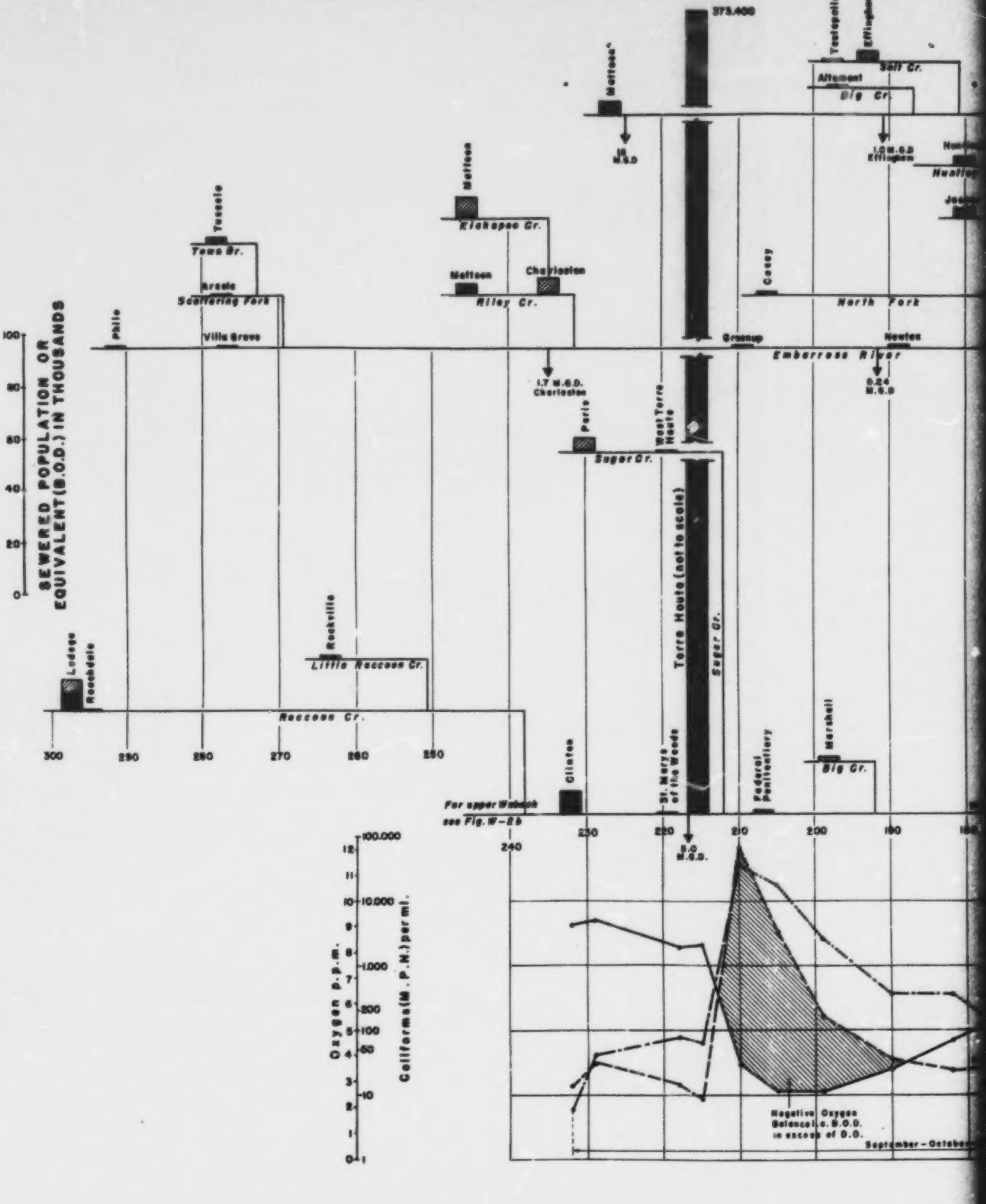
Figure W-1 shows the location and magnitude of each source of pollution of consequence in the basin. Figures W-2a, W-2b, W-2c and W-2d show similar data for four sections of the basin and, in addition, the location of water supply intakes from polluted streams and laboratory data on coliform organisms, dissolved oxygen and B.O.D. The pollution loadings shown represent the total of all sewage and industrial wastes in given communities.

Public Water Supplies - Only 46 of the 275 public water supplies in the basin are taken from surface sources but these serve more than 750,000 of the 1,300,000 served by all of the supplies. The underground water is generally hard and often contains objectionable amounts of iron but is usually of good enough quality to make it cheaper to use than surface water. Underground water is not generally available in large enough quantities to satisfy the needs of the larger cities.

Thirty of the surface water supplies serving 687,500 people are from streams subject to pollution. Table W-2 shows data on these supplies. The Indianapolis supply, taken largely from the West Fork of White River, has until recently been polluted by untreated sewage from Muncie, Anderson, Elwood and a number of smaller towns. The recently installed sewage treatment plants at the three larger cities should do much to improve the quality of the raw water at Indianapolis. Princeton, Indiana is being forced to abandon its surface water supply from Patoka River on account of gross pollution by oil field brines and acid mine drainage.

Sewerage - Table W-3 shows the sewered population at some of the larger sources of pollution. About 73 percent of the sewered population of 1,119,700 is served by the 85 treatment plants in the basin. Secondary treatment predominates. The sewage from only 39,100 receives primary treatment, while that from 782,900 receives secondary treatment.

Industrial Wastes - This type of pollution exceeds that from domestic sewage. Two hundred and fifty industrial plants, not connected to municipal treatment plants, discharge wastes with a sewered population equivalent of 1,224,500. About half of these plants are canneries. The canneries and the 12 paper plants (predominantly strawboard or straw paper plants) account for about 80 percent of the industrial waste load not discharged to municipal treatment plants. Table W-4 summarizes data on



OHIO RIVER POLLUTION SURVEY
U.S. PUBLIC HEALTH SERVICE
1941

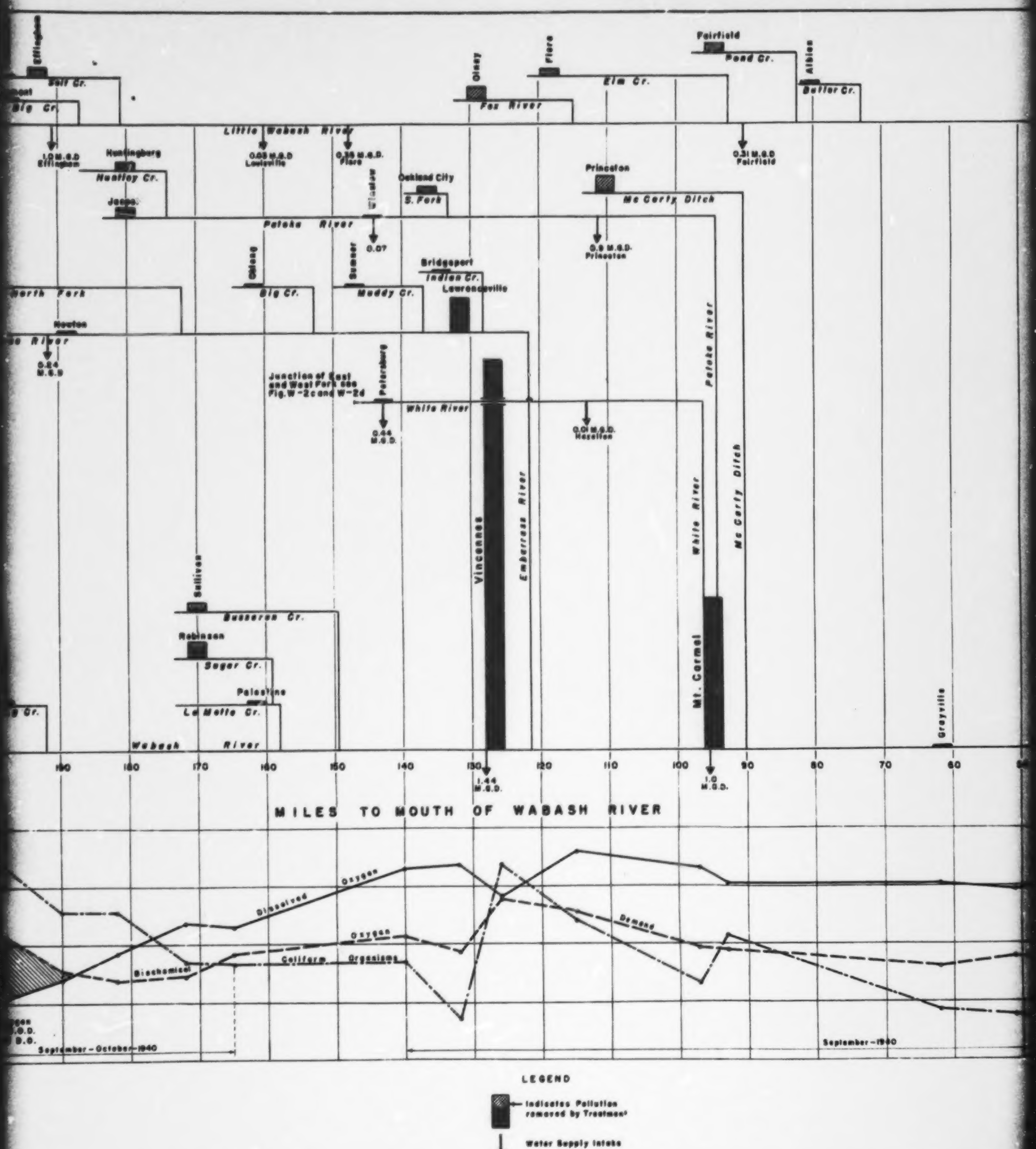

Effingham
Salt Cr.
Big Cr.
1.0 M.G.D. Effingham
Huntingburg
Huntley Cr.
Jasper
Little Wabash River
0.05 M.G.D. Louisville
0.35 M.G.D. Flora
Olney
Fox River
Flora
Elm Cr.
Fairfield
Pond Cr.
Albion
Bonpas Cr.
0.31 M.G.D. Fairfield
Princeton
Mc Carty Ditch
0.9 M.G.D. Princeton
Oakland City
S. Fork
Winslow
Patoka River
0.07
Bridgeport
Indian Cr.
Lawrenceville
Olney
Big Cr.
Sumner
Muddy Cr.
North Fork
Newton
Embarrass River
0.24 M.G.D.
Junction of East and West Fork see Fig. W-2c and W-2d
Petersburg
White River
0.44 M.G.D.
0.01 M.G.D. Hazelton
Patoka River
Vincennes
Embarrass River
White River
Mc Carty Ditch
Mt. Carmel
Sullivan
Busseron Cr.
Robinson
Sugar Cr.
Palestine
La Motte Cr.
Wabash River
Grayville
190
180
170
160
150
140
130
1.44 M.G.D.
120
110
100
1.0 M.G.D.
90
80
70
60
MILES TO MOUTH OF WABASH RIVER
Dissolved Oxygen
Biochemical Oxygen Demand
Coliform Organisms
September-October-1940
September-1940
LEGEND
Indicates Pollution removed by Treatment
Water Supply Intake

Fig. W-2a

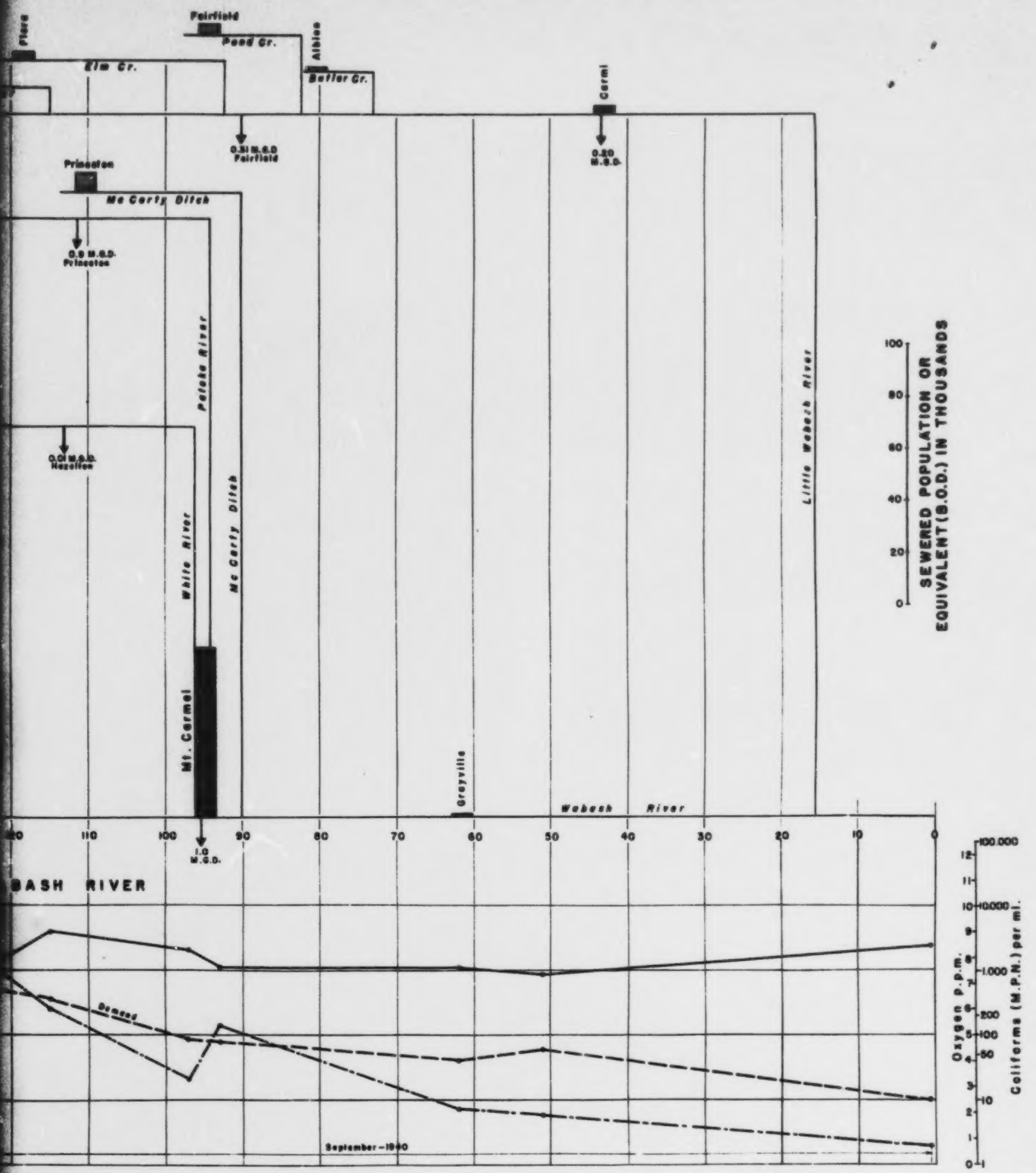
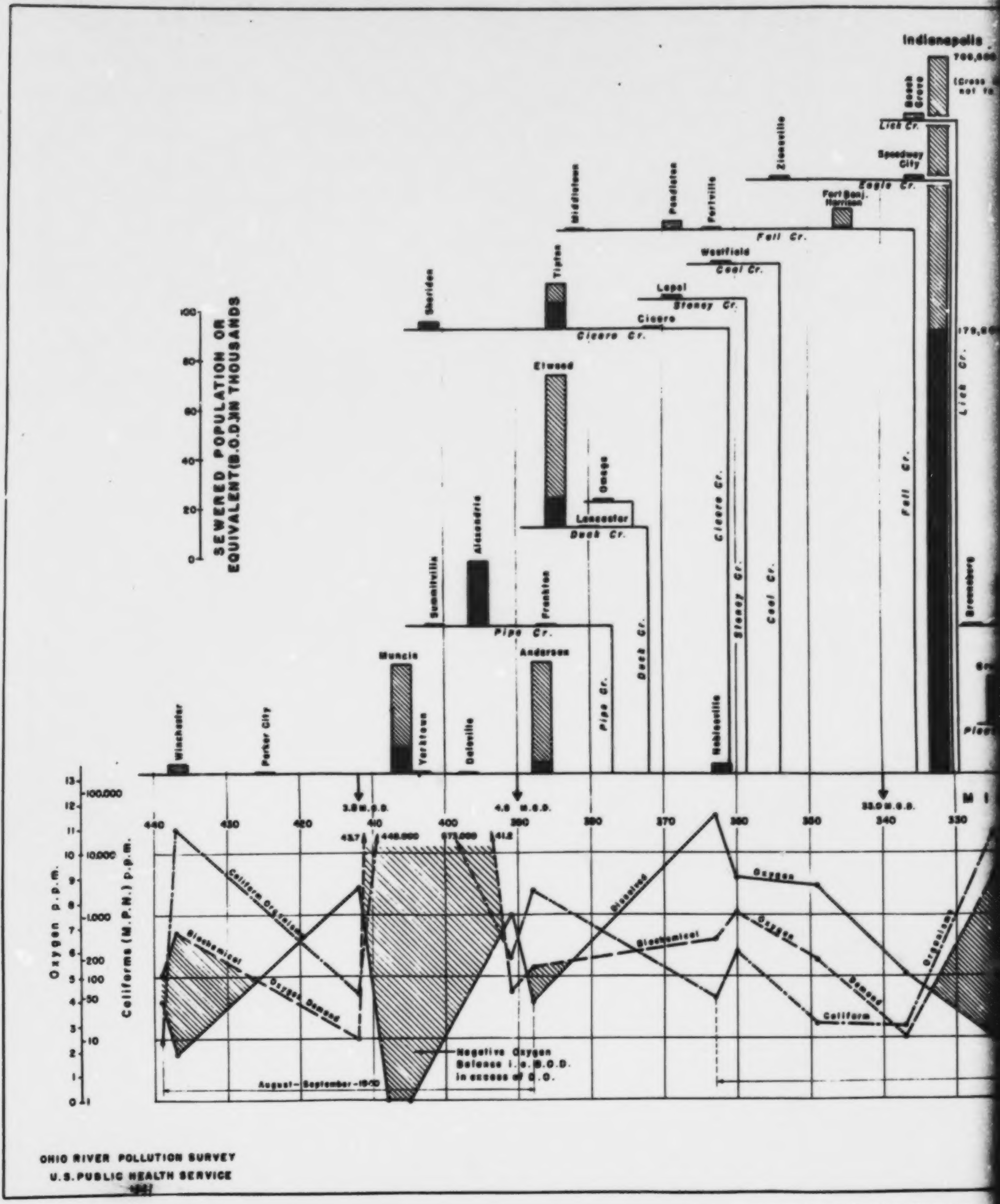


FIG. W-2a

LOWER WABASH RIVER
SOURCES OF POLLUTION
AND
SELECTED LABORATORY DATA

660-A



OHIO RIVER POLLUTION SURVEY
U.S. PUBLIC HEALTH SERVICE
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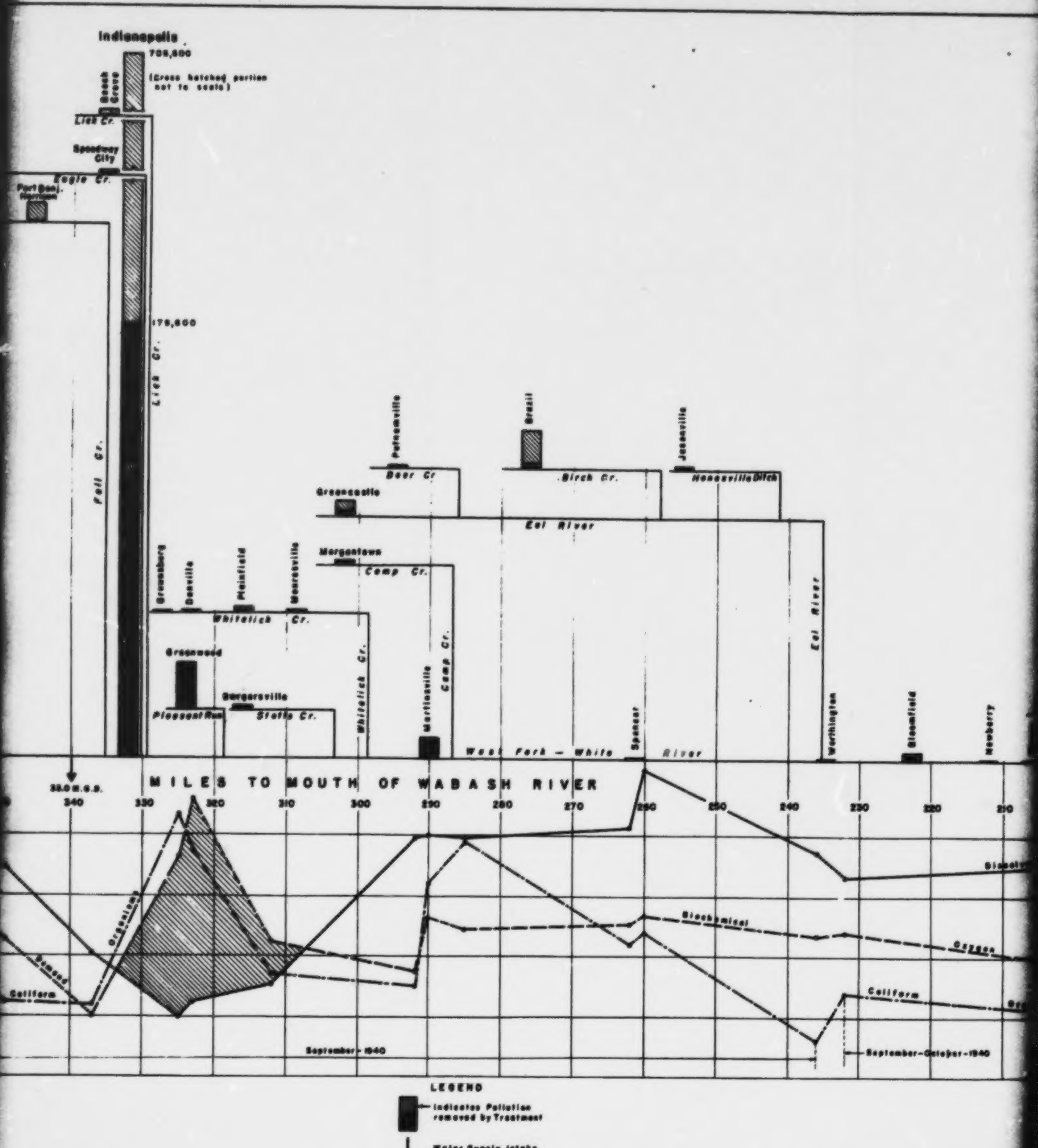

Indianapolis
705,600
(Cross hatched portion not to scale)
Beech Grove
Lick Cr.
Speedway City
Eagle Cr.
Port Benj. Harrison
179,600
Lick Cr.
Fall Cr.
Putnamville
Beer Cr.
Brazil
Birch Cr.
Jasonville
Honeyville Ditch
Greencastle
Eel River
Morgantown
Camp Cr.
Brownsburg
Danville
Plainfield
Mooresville
Whitelick Cr.
Greenwood
Bargersville
Pleasant Run
Stotts Cr.
Whitelick Cr.
Martinsville
Camp Cr.
Eel River
West Fork – White River
Spencer
Worthington
Bloomfield
Newberry
33.0 m.g.d.
MILES TO MOUTH OF WABASH RIVER
340
330
320
310
300
290
280
270
260
250
240
230
220
210
Organisms
Demand
Coliform
Dissolv
Biochemical
Oxygen
Coliform
Or
September-1940
September-October-1940
LEGEND
Indicates Pollution removed by Treatment
Water Supply intake

Fig. W-2c

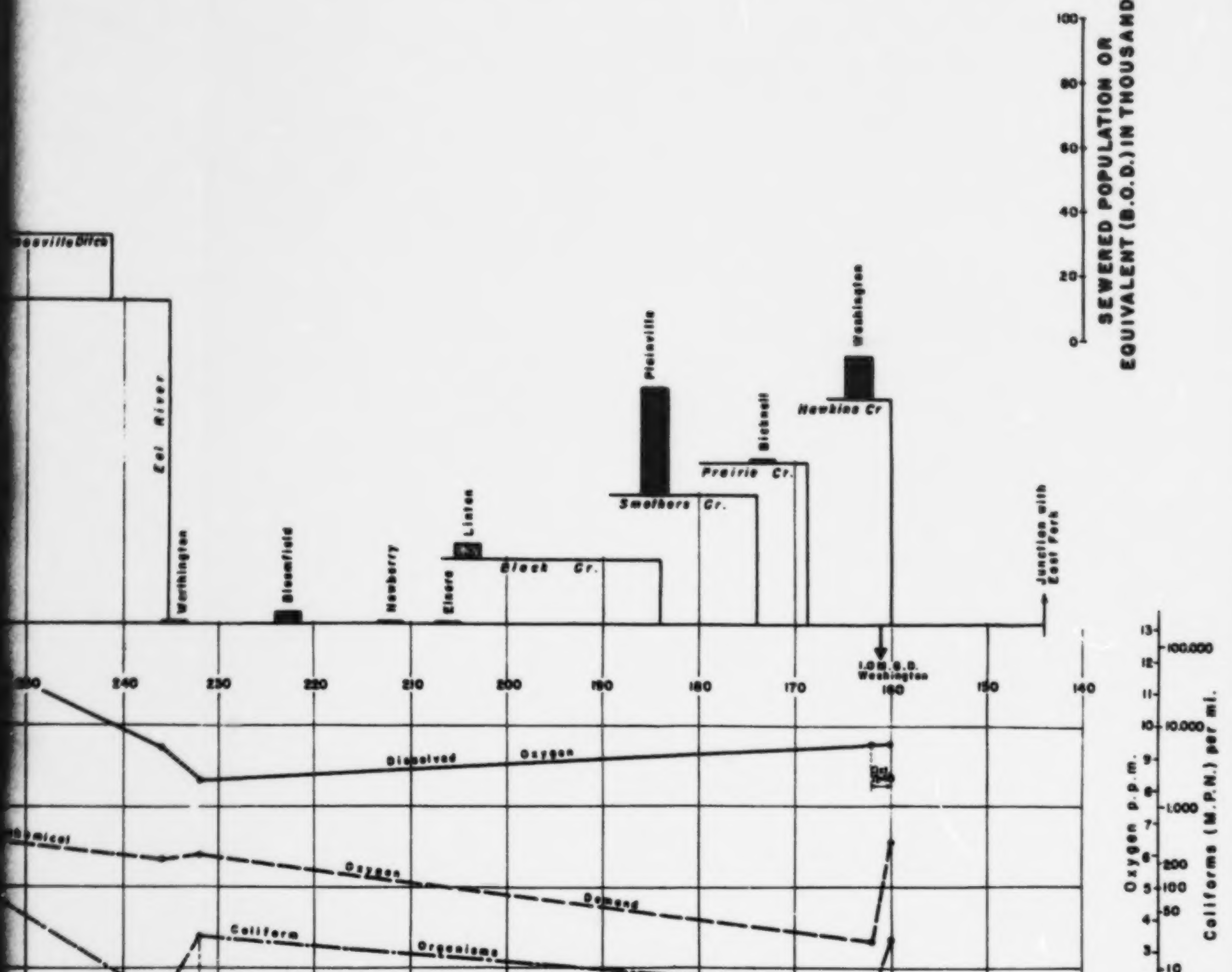
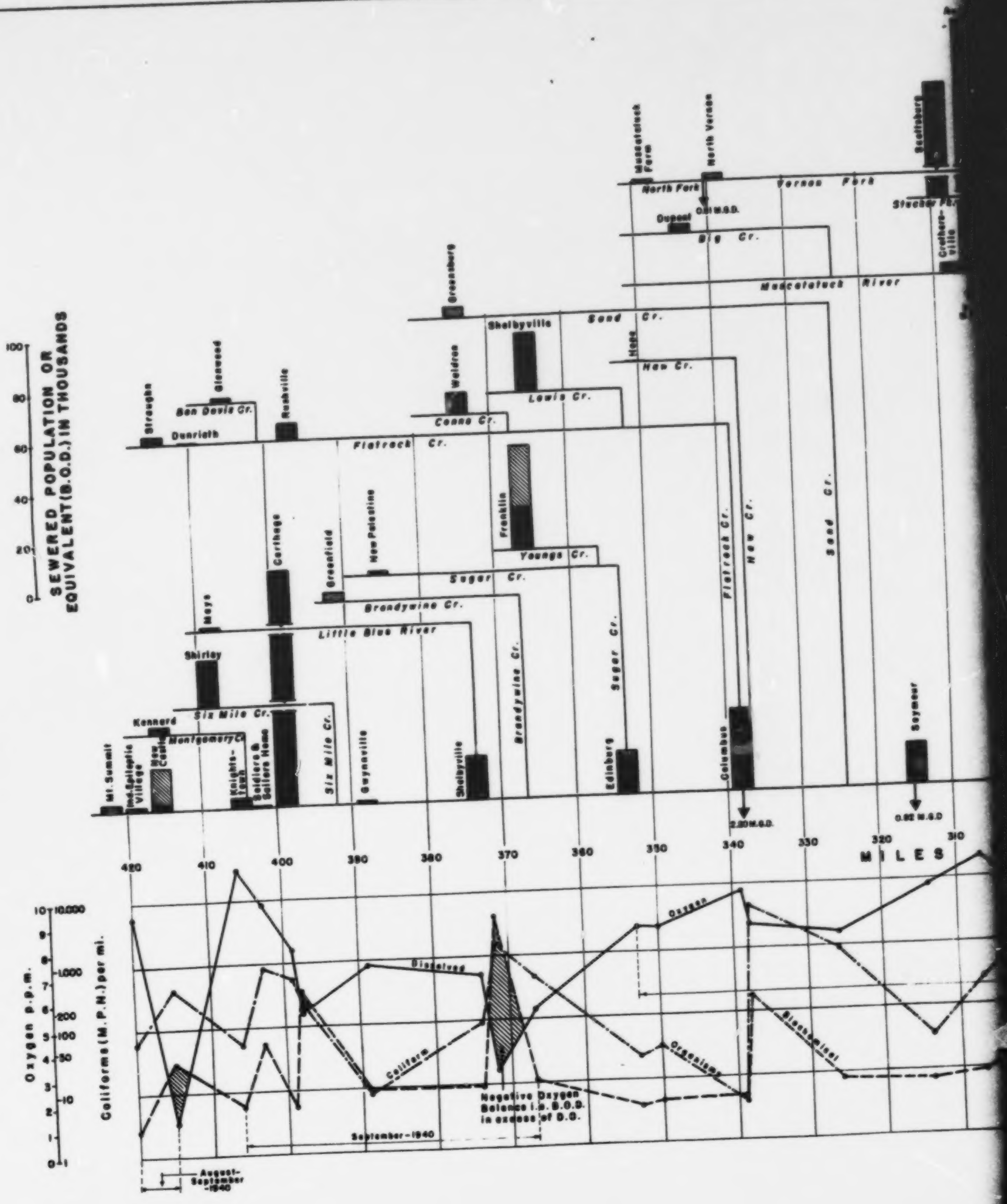


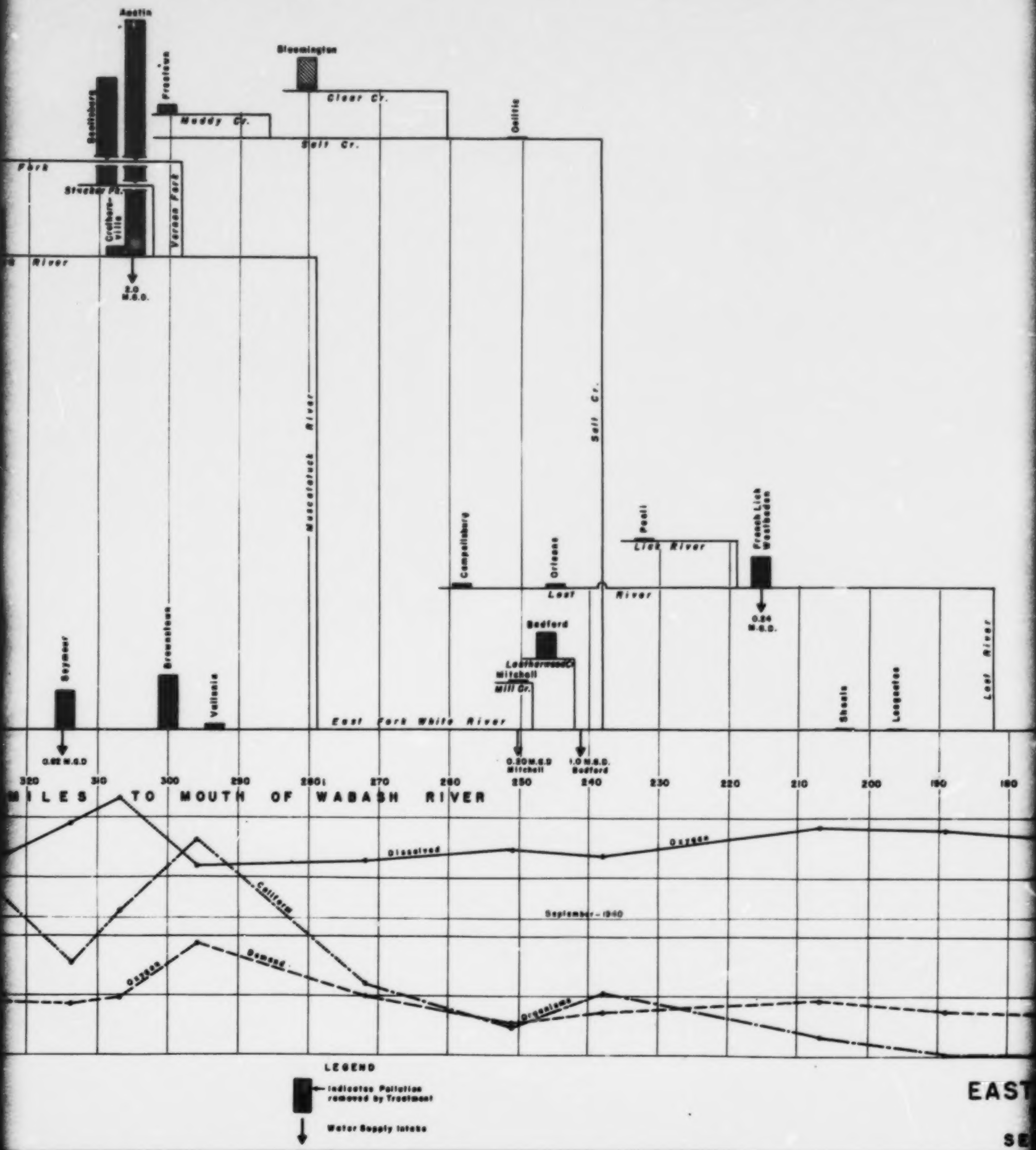
FIG. W-2c

WEST FORK-WHITE RIVER
SOURCES OF POLLUTION AND SELECTED LABORATORY DATA

660-C



OHIO RIVER POLLUTION SURVEY
U.S. PUBLIC HEALTH SERVICE
1941


Austin
Scottsburg
Frenchtown
Bloomington
Clear Cr.
Muddy Cr.
Salt Cr.
Oolitic
Fork
Stucker Fk.
Crothersville
Vernon Fork
River
2.0 M.G.D.
Muscatatuck River
Salt Cr.
Campbellsburg
Orleans
Paoli
Lick River
French Lick
West Baden
Lost River
0.24 M.G.D.
Bedford
Leatherwood Cr.
Mitchell
Mill Cr.
Seymour
Brownstown
Vallonia
East Fork White River
Shoals
Loogootee
Lost River
0.82 M.G.D.
0.30 M.G.D. Mitchell
1.0 M.G.D. Bedford
320
310
300
290
280
270
260
250
240
230
220
210
200
190
180
MILES TO MOUTH OF WABASH RIVER
Dissolved Oxygen
Coliform Organisms
September - 1940
Oxygen Demand
LEGEND
Indicates Pollution removed by Treatment
Water Supply Intake

EAST

SE

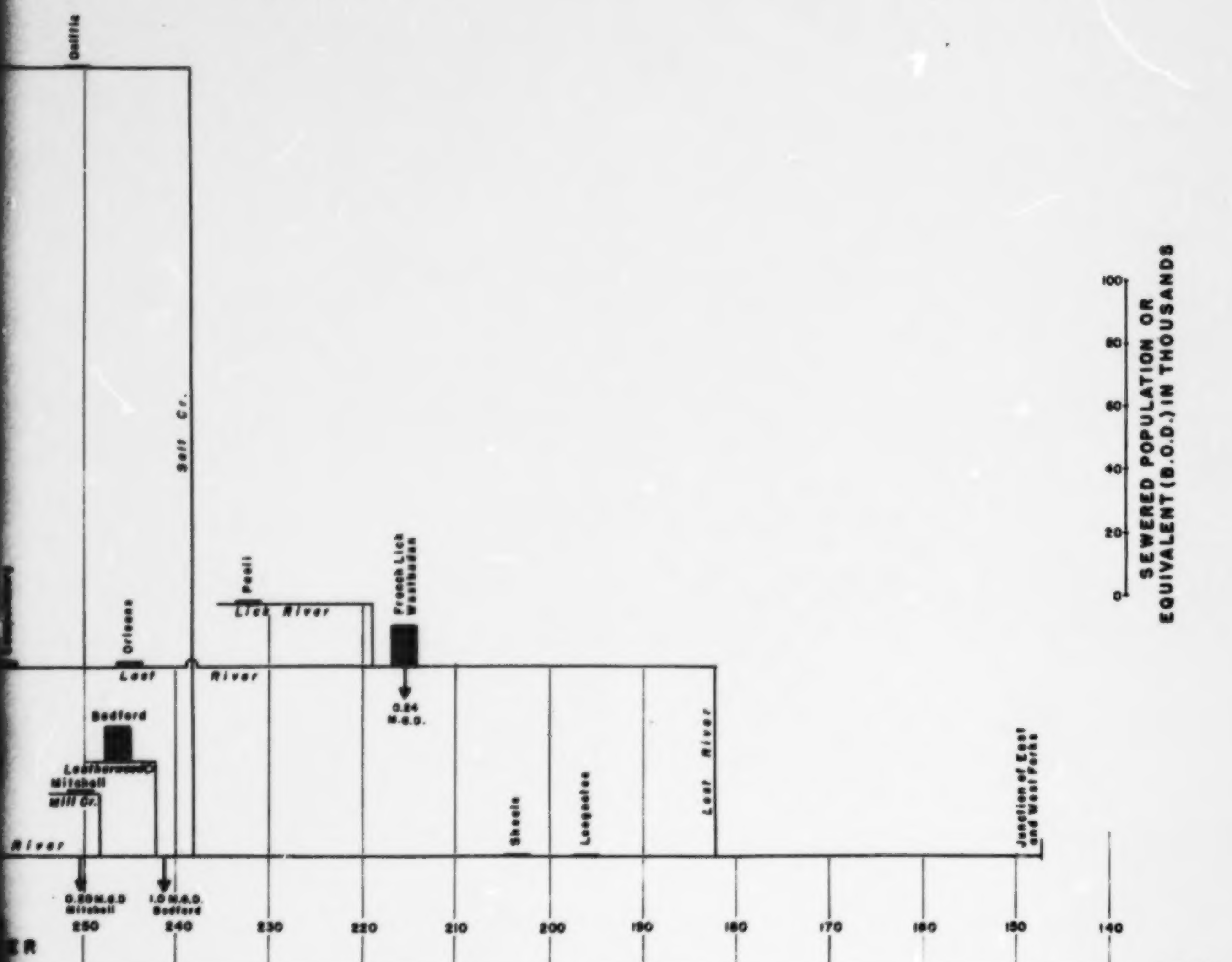


FIG. W-2d

EAST FORK WHITE RIVER
SOURCES OF POLLUTION
AND
SELECTED LABORATORY DATA

460-D

FIG. W-28

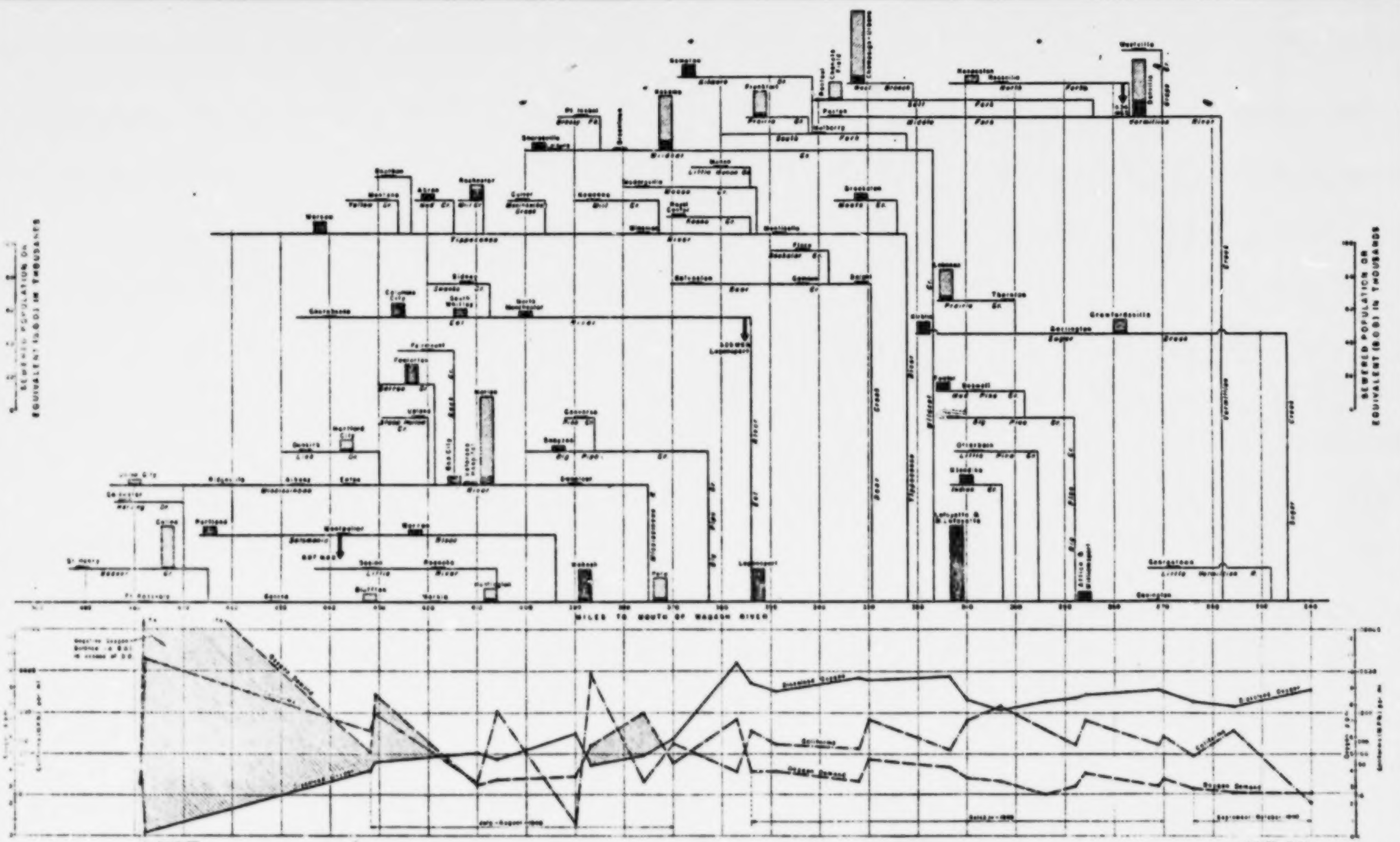


FIGURE W-28

UPPER WABASH RIVER

SOURCES OF POLLUTION
and
SELECTED LABORATORY DATA

OHIO RIVER POLLUTION SURVEY
U S PUBLIC HEALTH SERVICE

660-F

Table W-2 Wabash River Basin - Surface Water Supplies

Supply	State	Source	Mile (1)	Treat-ment (2)	Popu-lation Served	Cons. M.G.D.
Supplies Below Community Sewer Outfalls						
Mt. Carmel	Ill.	Wabash River	95	FD	7,200	1.00
Vincennes	Ind.	" "	128.2	FD	15,000	1.44
Terre Haute	"	" "	215	FD	55,800	5.00
Carmi	Ill.	Little Wabash R.	43	FD	3,400	0.20
Fairfield	"	" " "	90	FD	2,800	0.31
Flora	"	" " "	148	FD	4,000	0.35
Louisville	"	" " "	160	FD	400	0.03
Effingham	"	" " " - Impounded	196	FD	5,000	1.00
Mattoon	"	Little Wabash- (Impounded)-Wells	226	LD	16,000	1.50
Princeton	Ind.	Patoka River	111	LD	7,700	0.90
Winslow	"	" "	144	FD	1,100	0.07
Hazelton	"	White River	113	None	300	0.01
Petersburg	"	" "	143	FD	3,000	0.44
Bedford	"	E.Fk. White River	241	FD	13,000	1.00
Mitchell	"	" " " "	250	FD	2,400	0.20
Seymour	"	" " " "	315	FD	8,000	0.82
Columbus	"	" " " "	338	FD	6,000	2.20
West Baden	"	Lost River	215	FD	2,400	0.24
Austin	"	Muscatatuck River	305	FD	1,500	2.00
North Vernon	"	N.Fk. Vernon Fork	340	FD	3,200	0.51
Washington	"	Wells-West Fk. White River	161	FD	8,800	1.00
Indianapolis	"	W.Fk. White River- Fall Cr.-Wells	340	FD(3)	375,000	33.00
Anderson	"	W. Fk. White R.	390	FD	38,000	4.80
Muncie	"	" " " -Wells	412	FD	43,000	3.80
Pendleton Reformatory	"	Fall Creek	367	FD	2,000	0.60
Newton	Ill.	Embarrass River	188.5	FD	2,300	0.24
Charleston	"	" "	235	FD	8,000	1.70
Danville	"	N.Fk. Vermillion R	278	FD	32,000	4.34
Logansport	Ind.	Eel River	355	FD	19,000	3.25
Montpelier	"	Salamonie River	437.5	FD	1,200	0.07
Total - 30 Below Sewer Outfalls					687,500	72,02
16 Other Surface Supplies					65,100	5.37
Total - Surface Water Supplies					752,600	77.39

(1) Miles above mouth of Wabash River.

(2) F - Coagulated, settled, filtered; L - Lime-soda softened; D - Chlorinated.

(3) Two filter plants, one with slow sand filters.

Table W-3 Wabash River Basin - Sources of Pollution, Including Industrial Wastes, Expressed as Sewered Population Equivalent (B.O.D.).

Municipality	State	Receiving Stream	Miles Above Mouth of Wabash R.	Population Connected to Sewers	Treatment	Sewered Population Equivalent (B.O.D.)	
						Untreated	Discharged
Mt. Carmel	Ill.	Wabash River	95	6,000	None	65,000	65,000
Vincennes	Ind.	" "	127	14,500	"	168,400	168,400
Terre Haute	"	" "	215	26,000	"	373,400	373,400
Clinton	"	" "	232	6,000	"	8,500	8,500
Attica	"	" "	287	2,500	"	5,500	5,500
West Lafayette	"	" "	312	13,000	"	13,000	13,000
Lafayette	"	" "	312	26,000	"	32,400	32,400
Logansport	"	" "	353	16,000	"	19,700	19,700
Wabash	"	" "	388	6,500	"	19,500	19,500
Seymour	"	E. Fork White River	315	6,000	"	16,400	16,400
Columbus	"	" " " "	338	9,000	"	32,600	32,600
Edinburg	"	Blue River	353	2,000	Secondary	17,000	15,300
Shelbyville	"	" " -Lewis Creek	373	7,000	None	40,400	40,400
Carthage	"	" "	399	300	"	92,800	92,800
Knightstown	"	" "	405	1,700	"	4,000	4,000
Martinsville	"	West Fork White River	290	3,200	"	8,700	8,700
Indianapolis	"	" " " "	332	370,000	Secondary	706,600	179,600
Noblesville	"	" " " "	362	3,900	None	4,000	4,000
Anderson	"	" " " "	387	37,500	Secondary	45,500	4,600
Muncie	"	" " " "	406	40,000	"	46,000	10,700
Lawrenceville	Ill.	Embarrass River	131	2,000	None	15,000	15,000
Danville	"	Vermilion River	275	28,000	Chemical	34,200	9,800
North Manchester	Ind.	Eel River	400	3,100	None	3,900	3,900
South Whitley	"	" "	417	900	"	5,400	5,400
Marion	"	Mississinewa River	408	19,500	Secondary	53,000	5,300
Gas City	"	" "	415	3,000	None	4,800	4,800
Portland	"	Salamonie River	465	5,300	"	5,400	5,400
Mattoon (1)	Ill.	Little Wabash R.- Kickapoo Cr.-Riley Cr.	227	14,500	Secondary	17,300	10,800
Huntingburg	Ind.	Hunley Creek	180	3,000	None	3,700	3,700
Jasper	"	Patoka River	180	4,000	"	4,000	4,000
French Lick - West Baden	"	Lost River	215	2,200	"	13,200	13,200
Bedford	"	Leatherwood Creek	246	11,300	"	11,300	11,300
Austin	"	Ditch to Muscatatuck R.	305	300	"	100,300	100,300
Scottsburg (2)	"	Stucker Fork	309	2,000	Primary	45,000	44,300
Brownstown	"	Ditch to E.Fk. White R.	300	300	None	23,100	23,100
Waldron	"	Conns Creek	374	-	-	8,600	8,600
Shirley	"	Six Mile Creek	409	400	None	18,700	18,700
Franklin	"	Youngs Creek	366	4,000	Secondary	41,000	16,700
Washington	"	Hawkins Creek	163	6,500	None	12,700	12,700
Plainville	"	Smothers Creek	195	-	-	33,000	33,000
Greenwood	"	Pleasant Run	324	1,500	None	19,500	19,500
Tipton	"	Cicero Creek	385	4,000	Secondary	18,500	10,600
Elwood (2)	"	Duck Creek	385	8,500	"	61,300	11,700
Alexandria	"	Pipe Creek	395	3,400	None	25,900	25,900
Robinson (2)	Ill.	Sugar Creek	170	3,000	Secondary	7,000	4,500
Kirklin	Ind.	Ditch to Sugar Creek	319	200	None	7,700	7,700
Champaign	Ill.	W. Br. Salt Fork	332	43,000	Secondary	43,000	4,400
Fowler	Ind.	Mud Pine Creek	317	1,200	None	5,300	5,300
Klondike	"	Indian Creek	310	-	"	6,000	6,000
Kempton	"	Swamp Creek	367	-	-	7,500	7,500
Kokomo	"	Wildcat Creek	371	31,500	Secondary	32,800	6,000
Rochester	"	Mill Creek	410	3,000	Primary	9,500	6,300
Warsaw	"	Walnut Creek	442	5,900	None	7,400	7,400
Columbia City	"	Blue River	426	4,000	"	8,500	8,500
Fowlerton	"	Ditch to Barren Creek	423	-	-	12,000	12,000
243 Other Sources				303,100		446,800	211,100
Total - Illinois				164,000		253,500	133,700
Indiana				949,300		2,608,500	1,681,800
Ohio				6,400		29,700	3,400
Total - Entire Basin				1,119,700		2,891,700	1,818,900

(1) Part of sewage treated. (2) Plant not in operation at time of laboratory survey.

Table W-4 Wabash River Basin - Summary of Industrial Wastes not Discharging to Municipal Treatment Plants, with Total of Entire Industrial Waste Load in the Basin.

Industry	Number of Plants	Industrial Waste Disposal		At Least Minor Corrective Measures Taken	Estimated Sewered Population Equivalent (B.O.D.)
		Munic. Sewers	Private Outlet		
Breweries	3	2	1	3	42,000
Canneries	123	26	97	121	530,000
Distilleries	2	-	2	2	121,000
Meat	31	6	25	30	36,100
Milk	45	25	20	34	11,900
Oil Refineries	2	2	-	2	17,000
Paper	12	3	9	11	444,300
Steel	4	-	4	2	-
Textiles	3	2	1	-	8,200
Miscellaneous	25	15	10	12	14,000
Waste Unconnected Munic. Treatment	250	81	169	217	1,224,500
Waste Discharged to Municipal Treatment					547,500
Total Industrial Waste in Basin					1,772,000
By States - Illinois					89,500
Indiana					1,659,200
Ohio					23,300

industrial wastes by type of industry. Most of the industries make some attempt to reduce pollution but in the majority of instances additional treatment or recovery is needed.

No differentiation has been made in the tables, maps, or charts between wastes which are discharged only seasonally and those which are discharged throughout the year. The pollution loadings shown represent conditions at the time of maximum seasonal operations. In the case of the canning industry this may occur only during a few weeks in the year but these few weeks are often during the late summer when the effects of organic pollution on the oxygen balance of the streams are most serious.

Acid Mine Drainage - Mine waste has caused the greatest damage in the area drained by Patoka River. Prior to the inauguration of the mine sealing program, about 110,000 tons of acid were discharged throughout the basin each year. The mine sealing program has reduced this to about 63,000 tons per year.

Many of the mines in this area are strip mines. These have been sealed by damming the drainage outlet and flooding the acid producing strata. A number of the lakes thus formed have been successfully stocked with fish and add to the recreational resources of the area.

Oil Fields - Wastes from oil fields do not at present cause a major pollution problem. Production in the older fields in both Illinois and Indiana is so small that even with relatively high brine-oil ratios the brine causes no particular problem in the larger streams. New activity in old fields in Indiana has seriously affected the Patoka River and Princeton, Indiana is being forced to abandon its water supply from that stream. The new fields in both states have been developed since 1937 and new drilling is going on continuously. Most of the production is in the area drained by the Little Wabash River but there is considerable activity in fields near the Wabash and drained directly by it or by small tributaries. Brine production is small at present and none of the water supplies from the Little Wabash has as yet been damaged. The State Health Department of Illinois is taking steps to prevent the development of a serious problem. Where brine production is small, ponding with subsequent release during high water is practiced. Where there are appreciable quantities of brine it is being reinjected into subsurface formations which are unsuitable for use as sources of potable water.

Presentation of Laboratory Data

Laboratory results indicate that the major pollution problem in the basin is in the stretch of about 60 miles of the Wabash below Terre Haute. Poor sanitary conditions were also observed along the upper Wabash from Ft. Recovery to below Bluffton, along the White River below Indianapolis, and along the Muscatatuck River. More or less localized pollution problems were found at Hartford City, Portland, Gas City, Columbia City, Warsaw, Kokomo, Frankfort, Rantoul, Danville, Mattoon, Flora, Albion, Muncie, Elwood, Franklin and West Baden, with the worst conditions below Warsaw, Portland, Muncie, Hartford City and West Baden. In general, the White River was found to be more heavily polluted than the Wabash but natural purification was more rapid along the White than along the Wabash.

Summaries of laboratory results are shown in Table W-7. Selected data appear in Table W-5. The observations in this basin were carried out by mobile laboratory units during the period July-November, 1940, and during February, 1941. From one to twelve samples were collected at each sampling point. Figures W-3, W-4 and W-5 show graphically the coliform, dissolved oxygen and oxygen demand results, respectively. The data thus shown represent the average of all samples where observations were made for a period of less than one month. Where observations extended over several months the results shown are the most unfavorable monthly averages.

Stream flows were generally among the lowest of record during the period covered by this survey. In many instances, on the smaller streams, zero discharges made observations above towns impossible and minimum stages made general sample collections somewhat difficult.

Average coliform densities in excess of 400 per ml. were observed in the Wabash for nearly 60 miles below Terre Haute in November, 1940. Oxygen demands in excess of 12 p.p.m. and dissolved oxygen concentrations of less than 3 p.p.m. were observed below the city. Reductions in oxygen demand appeared to be relatively rapid during the summer months but somewhat slower during cooler weather.

Coliform results on the Wabash showed slightly worse pollution than did the oxygen demand results but, in the main, were in close agreement as to the location of poor sanitary conditions Little, if any, correlation appeared to exist between the dissolved oxygen results and the other observations, except in a few grossly polluted areas. This may have been due to photosynthesis or to low water temperatures. Considerable natural purification appears to have been effected at fairly rapid rates below sources of pollution.

A few acid stream samples were taken in the Patoka River area along the South Fork ditch and in the vicinity of Patoka. pH values ranged from 3.4 to 4.7 and phenolphthalein acidities of over 500 parts per million were found.

At its mouth the Wabash River was found to be in good sanitary condition.

Biological Summary - The plankton population of the Wabash and the larger tributaries is the highest in the entire Ohio Basin -- the total volumes often reaching 12,000 to 14,000 p.p.m. and in a few cases as high as 75,000 p.p.m. These high values are due to the increase in the available plant food as a result of the decomposition of the sewage from the heavily populated centers. The fertility of the stream is also reflected in the large mixed fish population.

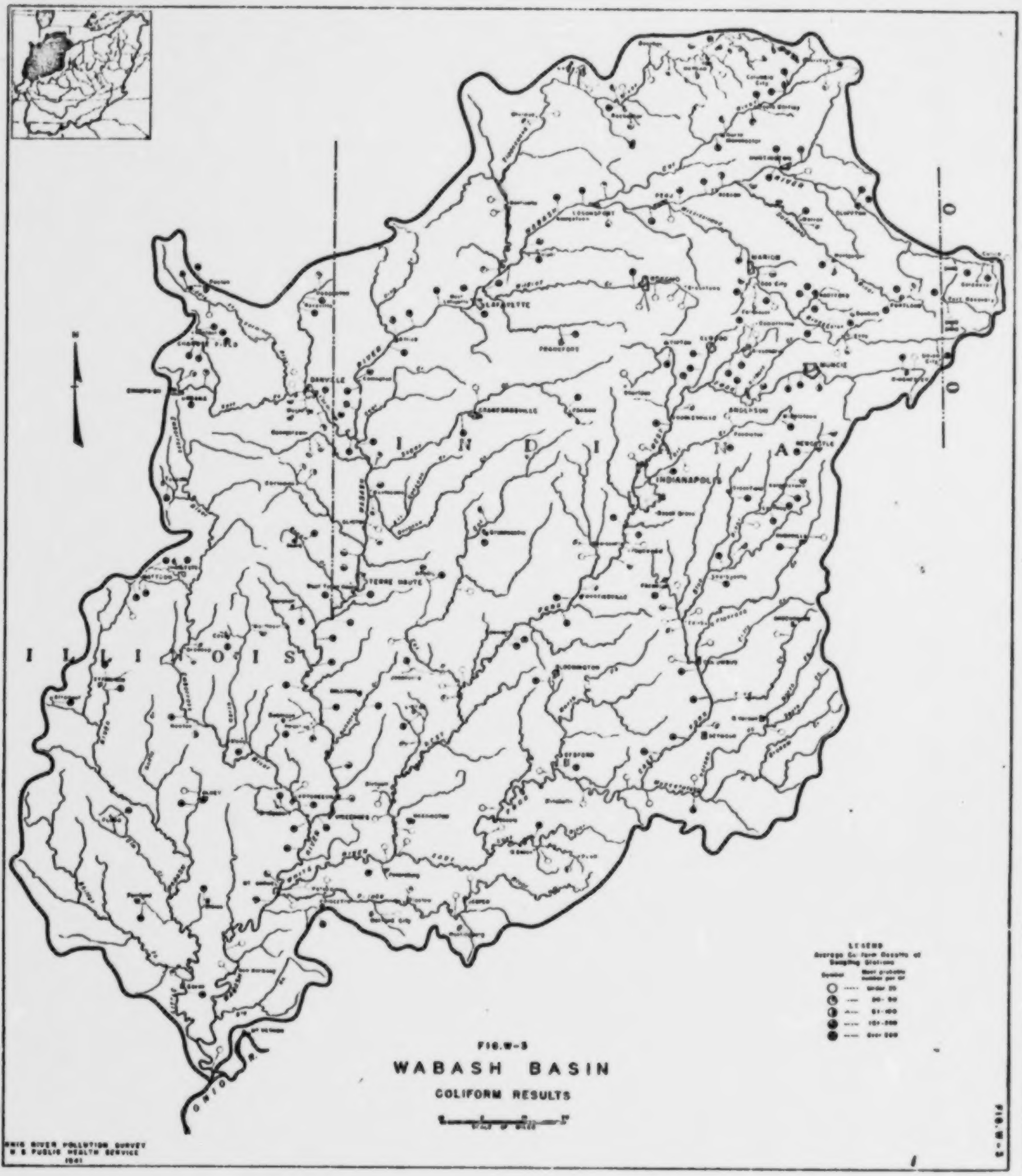

ILLINOIS
INDIANA
OHIO
LAFAYETTE
DANVILLE
CRAWFORDSVILLE
INDIANAPOLIS
TERRE HAUTE
VINCENNES
LOGANSPORT
PERU
MARION
ANDERSON
MUNCIE
NEW CASTLE
BLOOMINGTON
BEDFORD
WABASH RIVER
OHIO R.
LEGEND
Average Coliform Results at Sampling Stations
Symbol
Most probable number per cc
Under 20
20 - 50
51 - 100
101 - 500
Over 500
OHIO RIVER POLLUTION SURVEY
U S PUBLIC HEALTH SERVICE
1941
FIG. W-3

FIG. W-3

WABASH BASIN

COLIFORM RESULTS

666-H

Table W-5 Wabash River Basin - Selected Laboratory Data.

River	Wabash		Wabash		Wabash		Wabash
Location	above	below	above	below	above	below	above
	Fort Recovery,Ohio		Logansport		Lafayette		Terre Haute
River Miles Above: Mouth of Wabash	479	478	357	354	313.5	309	215
Period - 1940	Aug.	Aug.	Sept.-Oct.	Sept.-Oct.	Oct.	Oct.	Sept.-Oct.
Number of Samples	1	3	5	5	4	4	5
Flow in c.f.s.: Sampling Days	1	*	185	340	1,118	1,144	1,224
Minimum Month				203	518		970
Water Temperature °C.	23.5	23.0	14.1	15.4	15.6	15.3	16.3
Coliforms per ml.	21	20,000	37	354	128	1,330	60
Dissolved oxygen ppm.	5.1	0.2	10.5	9.3	9.7	7.7	8.3
B.O.D.,5-day, p.p.m.	3.2	17.4	7.1	3.9	4.2	3.3	2.3

River	Wabash		Wabash		Wabash		Wabash
Location	below	below	above	below	above	below	at
	Terre Haute		Vincennes		Mt. Carmel		Mouth
River Miles Above: Mouth of Wabash	210	199	152	126	97	93	0.5
Period - 1940	Sept.-Oct	Sept.-Oct	Sept.	Sept.	Sept.	Sept.	Sept.
Number of Samples	5	5	4	4	4	4	4
Flow in c.f.s.: Sampling Days	1,220	1,230	1,600	1,600	1.680	2,680	3,000
Minimum Month			1,303			2,330	
Water Temperature °C.	15.3	16.8	22.0	22.1	22.7	22.7	22.4
Coliforms per ml.	34,000	2,400	9	2,160	19	130	2
Dissolved oxygen ppm.	3.6	2.6	8.4	7.0	8.2	7.6	9.4
B.O.D.,5-day, p.p.m.	12.1	5.4	4.5	7.0	4.9	4.7	2.5

River	Salamonie River		Little Lick Cr. below	Thorn Creek		Walnut Creek	
Location	above	below	Hartford	above	below	above	below
	Portland		City	Columbia City		Warsaw	
River Miles Above: Mouth of Wabash	466	462	437	427	425	444	443
Period - 1940	Aug.	Aug.	Aug.-Sept.	July-Aug.	July-Aug.	July-Aug.	July-Aug.
Number of Samples	3	3	3	3	3	3	3
Flow in c.f.s.: Sampling Days	*	4	1	7	7	2	5
Water Temperature °C.	22.5	22.3	22.8	21.7	22.8	26.5	24.3
Coliforms per ml.	46	67,300	16,600	691	46,200	26	283000
Dissolved oxygen ppm.	6.2	0.0	0.0	4.7	0.5	11.1	0.0
B.O.D.,5-day,p.p.m.	2.3	9.8	29.6	2.7	41.9	1.9	45.2

River	Wildcat Cr.		Prairie Cr.	Salt Fork		Vermillion River	
Location	above	below	below	above	below	above	below
	Kokomo		Frankfort	Rantoul		Danville	
River Miles Above: Mouth of Wabash	373	371	349	339	338	277	273
Period - 1940	July	July	Oct.	July-Aug.	July-Aug.	July-Aug.	July-Aug.
Number of Samples	3	3	3	3	3	3	3
Flow in c.f.s.: Sampling Days	7	9	3	*	2	50	32
Minimum Month							12.8
Water Temperature °C.	23.0	23.8	14.8	23.3	23.6	31.3	28.8
Coliforms per ml.	14	4,680	88,100	148	2,340	18	39,400
Dissolved oxygen ppm.	4.3	1.0	2.4	7.6	2.3	7.7	2.7
B.O.D.,5-day p.p.m.	4.6	3.9	22.2	1.4	12.9	2.1	13.4

River	Kickapoo Cr.below	West Fk.-White R.		West Fk.-White R.		Duck Cr.	Youngs Cr.
Location	Mattoon	above	below	above	below	below	below
		Muncie		Indianapolis		Elwood	Franklin
River Miles Above: Mouth of Wabash	244	412	405	349	325	382	364
Period - 1940	Aug.	Aug.-Sept	Aug.-Sept	Sept.	Sept.	Aug.-Sept	Sept.
Number of Samples	3	3	3	5	5	3	3
Flow in c.f.s.: Sampling Days	1	8	9	69	126	3	2
Minimum Month		3.2			58.0		
Water Temperature °C.	22.8	22.7	20.0	18.7	25.8	19.8	17.0
Coliforms per ml.	30,000	55	673,000	18	23,200	96,000	28,300
Dissolved oxygen ppm.	0.4	8.7	0.0	8.7	2.9	0.8	0.2
B.O.D.,5-day, p.p.m.	25.0	2.5	41.2	5.7	9.1	40.3	113

River	Muscatatuck River		Lost River		Seminary Cr.	Butler Cr.
Location	below	above	above	below	below	below
	Vernon Fk.	Mouth	West Baden		Flora	Albion
River Miles Above: Mouth of Wabash	297	282	217	216	120	81
Period - 1940	Oct.	Oct.	Oct.	Oct.	Aug.-Sept.	Aug.-Sept.
Number of Samples	3	6	3	3	3	3
Flow in c.f.s.: Sampling Days	5	6	6	7	*	*
Water Temperature °C.	12.8	15.3	13.7	15.0	19.5	19.0
Coliforms per ml.	720	1	7	12,500	8,230	3,070
Dissolved oxygen ppm.	0.0	2.2	5.8	0.0	2.6	5.2
B.O.D.,5-day, p.p.m.	186.0	4.4	1.5	10.0	15.0	18.0

* Less than one.

Hydrometric Data

Forty-eight stream gaging stations have been maintained in the basin for various periods and 35 stations are currently in operation. Table W-6 shows mean monthly flows at 24 of these stations during some of the driest summers of record.

Proposed Stream Control - Five flood-control reservoir sites have been studied by the U. S. Engineer Department for construction under the authorized program for Ohio River flood control. Data on these reservoirs are tabulated below:

Reservoir	Stream	Miles Above Mouth of Wabash River
Mansfield	Racoon Creek	259
Wolf Creek	Embarrass River	190
Cagles Mill	Mill Creek	285
Spencer	West Fork White	265
Shoals	East Fork White	208

There are no large sources of pollution along the streams below the latter three of these reservoirs with the exception of Mt. Carmel on the Wabash. Although there are no important sources of pollution on Raccoon Creek, below the Mansfield Reservoir site, any additional flow made available by the reservoir by using a portion of the flood-control capacity for low-flow regulation after the end of the flood season would be of value for pollution abatement at Terre Haute. Wastes from Lawrenceville are discharged to the Embarrass River below the Wolf Creek site and additional flow from the reservoir would be of value at that point. The value to pollution abatement of low-flow regulation from these reservoirs would not be great enough to warrant provision of additional storage capacity expressly for this purpose.

Table W-6 Wabash River Basin - Monthly Mean Summer Flows for Years in Which Lowest Summer Flows have Occurred.

River Location		Wabash Bluffton, Ind.	Wabash Wabash, Ind.	Wabash Logansport, Ind.	Wabash Terre Haute, Ind.	Wabash Mt. Carmel, Ill.	Mississinewa Marion, Ind.	Eel N.Manchester, Ind.
River Miles Above:								
Conf.with Wabash		-	-	-	-	-	33	46
Mouth of Wabash		421.8	387.7	353.9	214.4	91.5	408	400
Drain. Area Sq.Mi.		470	1,670	3,760	12,200	28,600	740	429
Period of Record		1923-40	1923-40	1903-06 1923-40	1905-06 1928-40	1928-40	1924-40	1924-40
Year		1936	1940	1940	1936	1936	1940	1928
June	c.f.s.	23.9	856	1,810	2,960	5,760	279	195
July	"	39.0	164	511	970	3,220	56.3	229
August	"	9.09	57.1	241	1,240	2,330	25.0	61.8
September	"	8.63	44.0	203	2,640	3,810	21.0	37.9
Year		1935	1932	1939	1940	1940	1928	1940
June	"	78.5	363	1,450	8,154	15,115	1,170	229
July	"	131	327	1,156	2,444	5,570	316	89.6
August	"	47.7	45.9	699	1,183	2,890	50.5	44.4
September	"	9.05	291	233	1,062	2,450	24.8	50.6
Year		1939	1934	1936	1934	1930	1936	1930
June	"	172	128	595	1,440	6,050	65	87.9
July	"	100	55.4	269	1,380	4,110	32.6	45
August	"	46.4	207	374	3,140	3.280	31.7	130
September	"	9.62	132	525	3,450	3,670	43.4	61.7

River Location		Tippecanoe Monticello, Ind.	Vermillion Danville, Ill.	Embarrass Ste.Marie, Ill.	Patoka Patoka, Ind.	LittleWabash Wilcox, Ill.	W. Fk. White Muncie, Ind.	W. Fk. White Anderson, Ind.
River Miles Above:								
Conf.with Wabash		28	19	53	12	119	316	294
Mouth of Wabash		350	276	175	107	134	412	390
Drain. Area Sq.Mi.		1,740	1,280	1,540	843	1,130	259	412
Period of Record		1924-40 (1)	1915-21 1928-39	1910-12 1914-39	1935-40	1914-39	1924-29 1931-40	1925-27 1932-40
Year		1934	1920	1914	1936	1930	1940	1940
June	c.f.s.	303	252	-	7.93	20.6	117	226
July	"	180	54.0	-	18.9	9.75	16.7	51.3
August	"	489	54.2	-	3.58	4.26	4.8	5.1
September	"	1,007	14.4	13.5	9.90	372	3.2	20.9
Year		1940	1930	1922	1940	1936	1932	1936
June	"	1,027	165	364	146	19.0	109	76.6
July	"	429	67.9	257	71.4	30.0	30.9	37.9
August	"	237	17.9	52.2	11.3	4.44	7.18	34.8
September	"	240	35.7	26.3	24.4	7.26	94.5	33.8
Year		1936	1919	1930	1939	1922	1939	1934
June	"	624	576	155	571	100	92.8	93.4
July	"	246	130	80.3	223	121	53.6	50.5
August	"	298	43.8	27.9	318	12.4	27.9	37.3
September	"	406	20.7	137	20.1	5.37	9.34	44.0

River Location		W. Fk. White Noblesville, Ind.	W. Fk. White Indianapolis Ind.	Fall Cr. Millersville Ind.	E. Fk.White Seymour, Ind.	E. Fk. White Shoals, Ind.	Flat Rock Cr St.Paul, Ind.	Muscatatuck Austin, Ind.
River Miles Above:								
Conf.with Wabash		274	236	247	218	107	275	212
Mouth of Wabash		370	332	343	314	203	371	308
Drain. Area Sq.Mi.		819	1,620	327	2,340	4,940	303	368
Period of Record		1924-40	1904-06 1925-40	1925-26 1930-40	1923-40	1903-05 1908-16 1923-40	1925,1931-40	1932-40
Year		1940	1940	1940	1925	1911	1934	1936
June	c.f.s.	366	752	117	827	228	19.7	6.93
July	"	104	160	36.8	867	117	13.1	3.37
August	"	69.5	71.1	19.7	282	95.8	6.75	1.48
September	"	58.7	58.9	17.0	122	1,640	4.92	-
Year		1936	1936	1936	1927	1936	1936	1940
June	"	167	302	72.2	826	696	29.4	155
July	"	80.3	90.3	29.1	149	489	9.28	14.6
August	"	65.8	79.4	19.6	157	265	14.6	2.1
September	"	69.1	105	22.3	135	379	84.3	2.6
Year		1932	1939	1934	1936	1940	1940	1933
June	"	380	651	42.2	448	2,079	208	47.6
July	"	190	683	38.4	231	763	31.5	7.8
August	"	99.2	413	25.1	169	373	12.2	23.7
September	"	265	124	34.7	227	311	9.8	42.6

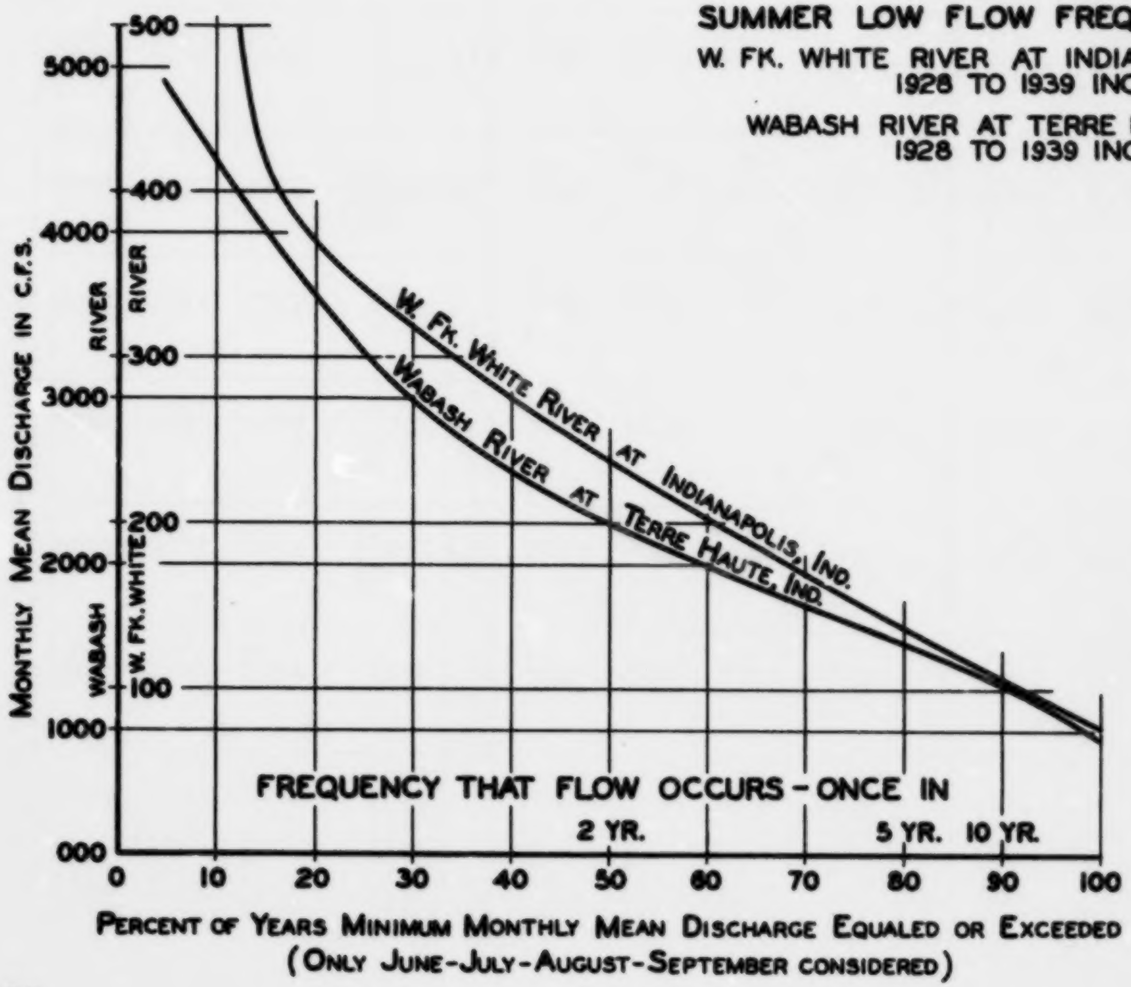
(1) From 1924-31 the station was at Pulaski, 32 miles upstream, drain. area 1,110 sq. mi. None of the flows at this station were as low as those at Monticello from 1932-40.

FIGURE W-6

SUMMER LOW FLOW FREQUENCY CURVE

W. FK. WHITE RIVER AT INDIANAPOLIS, IND.
1928 TO 1939 INCL.

WABASH RIVER AT TERRE HAUTE, IND.
1928 TO 1939 INCL.



U.S.E.D. - O.R.D.

Discussion

While commendable progress, in general, has been made in sewage treatment, untreated sewage from a number of cities and towns seriously affects the water supplies of downstream communities. The heaviest remaining pollution results from the discharge of untreated or inadequately treated industrial wastes.

At Terre Haute, the largest source of pollution in the basin, industrial wastes have a population equivalent of more than twelve times the sewered population. At some of the other communities where large canneries are located the ratio is even higher. A number of sewage treatment plants are successfully treating industrial waste loads that are considerably greater than the strictly domestic sewage load.

Wabash River - The four largest cities without sewage treatment works (Terre Haute, Vincennes, Lafayette, and Logansport) are all on the Wabash River. The flow in the river at these and at other communities on the main stream below Logansport is ample to permit the satisfactory disposal of sewage and most industrial wastes with only partial treatment.

The major part of the waste load at Terre Haute comes from strawboard plants and distilleries. Canneries, packing houses and a few other industries add to the industrial waste load. Although the city has a population of 62,000 only about 26,000 are served by the municipal sewerage system. Much of the industrial waste can be treated effectively at a municipal plant. Pretreatment at the industrial plant before discharge to city sewers is indicated in a few cases. The strawboard wastes here and also at Vincennes probably will require separate treatment.

Secondary sewage treatment is indicated at Wabash, the only town of appreciable size on the Wabash River above Logansport not now having such facilities.

East Fork of White River - Untreated sewage from a number of communities along the East Fork and its tributaries causes damage of more than local importance. The larger communities are Bedford, Columbus, Shelbyville and Seymour. Secondary treatment is indicated at the first three. Primary treatment should be sufficient at Seymour. Large amounts of untreated or inadequately treated industrial wastes, principally from canneries and a strawboard plant, contribute a much larger oxygen demand than the domestic sewage.

Four public water supplies are taken from the East Fork (see Table [illegible]-2) and the untreated water at all of these has been found occasionally to be rather heavily polluted, although at the time of the laboratory survey the bacterial counts were not unduly high. Evidence of the need for improved waste treatment in this area is shown by the epidemics of gastroenteritis, evidently water-borne, which occurred early in February, 1940 in the towns using the East Fork as a source of public water supply. Seymour was particularly hard hit; about one-quarter of the people using the public supply being affected. Those not using the public supply were not affected nor did communities using other sources of supply experience any similar outbreaks. The epidemics occurred with a rise in the river following a continued period of low flow during which the stream was covered with ice. These factors all indicate that the probable cause of the disorders was undue pollution of the stream by sewage and industrial wastes at a time when natural purification processes were least rapid.

Two large canneries, at Scottsburg and Austin, cause serious oxygen depletion of the Muscatatuck River for more than 25 miles. At the time of the laboratory survey the average dissolved oxygen content was found to be only 2.2 p.p.m. at the mouth of the stream and at other times the entire Muscatatuck River has been septic due to these wastes. The communities at which these canneries are located are small and the industrial wastes will need to be treated separately. Relatively complete treatment is indicated.

West Fork of White River - At Indianapolis the sewage flow is approaching the design capacity of the treatment plant built in 1925. Expansion of some of the units is necessary if the plant is to produce a satisfactory effluent. A number of the existing interceptors flow almost full during dry weather and even light rains cause overflows of untreated wastes into Fall Creek and the West Fork with attendant nuisance conditions. Larger or additional interceptors are indicated.

The larger cities and industries above Indianapolis water supply intake on the West Fork have taken steps to abate pollution. Sewage from Noblesville, however, still enters the stream without treatment. The provision of at least primary treatment and chlorination is indicated for the further protection of Indianapolis' water supply. Secondary treatment of sewage and industrial wastes at Alexandria is indicated. These wastes cause a serious local nuisance in Pipe Creek which enters the West Fork above Indianapolis. Complete treatment of sewage and cannery wastes at Pendleton and improvements to the existing treatment plant at the Pendleton Reformatory are needed to protect the quality of Fall Creek which is also used by Indianapolis as a source of public water supply.

Other Sources of Pollution - Existing sewage treatment plants at a number of cities need improvements or additions; among these are Danville, Ill., Sullivan, Franklin, Tipton, and Greencastle, Indiana. The majority of the communities now discharging untreated sewage are on small streams subject to extremely low flows. Secondary treatment is essential at these places to prevent local nuisances; Warsaw, Columbia City, Gas City, Huntingburg, Jasper, Portland and Washington, Indiana are examples of such communities.

A large part of the industrial waste load can be most easily and satisfactorily handled at municipal treatment plants. Wastes from many of the canneries and some of the other industries will require separate treatment. Small and moderate sized canneries which operate only seasonally can often dispose of their wastes without nuisance to lagoons or by broad irrigation if care is taken to prevent accidental discharges of wastes to the streams. Detailed study of some plants will be necessary to determine the most practicable method of handling the wastes. Several sewage treatment plants, notably those at Muncie, Crawfordsville and New Castle, Ind., have experienced operating difficulties because of acid pickle liquors discharged to the municipal sewers by metal processing plants. Either separate treatment or pretreatment of such wastes at the industrial plant seems necessary to prevent interference of these wastes with treatment processes.

Continuation of the work of the Illinois State Health Department on disposal of oil field wastes appears necessary. As the field becomes older and brine production increases, the water supplies taken from the Little Wabash River would be affected if present rigid methods of disposal were not continued. Resumption of the mine sealing program is desirable, particularly in Indiana.

Flow regulation by the proposed flood-control reservoirs on Raccoon Creek and the Embarrass River could be of value in abating pollution at Terre Haute and Lawrenceville. In neither case would the value to pollution abatement be large enough to have any appreciable influence on the economic justification of the project, nor would the provision of additional storage capacity solely for the purpose of pollution abatement be economically justified.

Estimated costs of existing treatment and of the suggested program of municipal and industrial waste treatment facilities are summarized in Table V-1.

TABLE W-7 WABASH RIVER BASIN

OHIO RIVER POLLUTION SURVEY
LABORATORY DATA

SUMMARY OF INDIVIDUAL RESULTS

Sampling Point	Mileage From Mouth		Date 1960		Average Discharge c.f.s.	Temp. °C	Dissolved Oxygen p.p.m.	Dissolved Oxygen % Sat.	5 Day B.O.D. p.p.m.	Coliform M.P.N. Per ml	pH	Turbidity p.p.m.	Alkalinity p.p.m.	Hardness p.p.m.
Wabash River, above Fort Recovery, Ohio	W	479	Aug.	29	1	23.5	5.1	59.2	3.2	21	7.8	60	180	
Wabash River, below Fort Recovery, Ohio	W	478	Aug.	15	**	27.5	0.8	9.5	12.7	4,600	7.7	30	278	280
" "	"	"	"	22	**	18.5	0.0	0.0	26.7	46,000	7.4	50	208	
" "	"	"	"	29	1	23.0	0.0	0.0	12.9	9,300	7.7	40	216	
Beaver Creek, above Celina, Ohio	WBe	476	"	15	7	25.5	7.6	91.6	5.3	23	7.6	130	90	130
" "	"	"	"	22	8	23.0	7.3	83.9	7.5	4	8.4	130	82	
" "	"	"	"	29	8	24.5	7.0	82.8	6.1	9	8.2	110	86	
Beaver Creek, 1/2 mi. below Celina, Ohio	WBe	473	"	15	10	26.0	2.4	29.0	5.1	93	7.5	85	108	190
" "	"	"	"	22	12	22.5	2.0	22.6	5.8	1,100	7.6	70	97	
" "	"	"	"	29	11	23.5	0.9	10.3	6.1	2,400	7.5	65	112	
[illegible] Cr. 1/2 mi. below Coldwater, Ohio	WBeCo	476	"	15	**	23.5	3.2	37.7	3.1	240	7.7	25	279	440
" "	"	"	"	22	**	17.5	2.3	24.3	6.2	460	7.6	35	279	
" "	"	"	"	29	**	22.5	1.6	17.8	6.4	2,400	7.7	90	301	
Wabash River, above Bluffton, Ind.	W	432	July	19	20	26.0	6.5	79.3	5.7	43	7.9	270	182	288
" "	"	"	"	29	16	27.0	4.2	52.5	4.7	7	8.0	100	208	
" "	"	"	Aug.	6	29	26.5	1.5	19.7	5.0	1,100	7.2	450	93	
Wabash River, below Bluffton, Ind.	W	431	July	19	20		6.9		4.4	93	8.1	170	194	300
" "	"	"	"	29	17	29.0	4.0	51.0	3.6	460	7.8	150	228	
" "	"	"	Aug.	6	30	26.5	2.7	33.4	17.8	2,400	7.2	150	144	
Wabash River, above Huntington, Ind.	W	410	July	26	26	31.5	5.3	71.5	4.4	23	8.1	110	207	296
" "	"	"	Aug.	5	10	25.0	5.3	63.4	1.9	12	8.0	120	224	
" "	"	"	"	13	20	25.0	4.7	55.8	3.0	24	8.0	110	208	
Wabash River, above Huntington, Ind.	W	410	Nov.	5	32	12.5	9.2	85.5	2.3	4	7.9	35	214	
" "	"	"	"	12	68	3.0	11.1	82.5	2.3	46	7.9	40	218	
" "	"	"	"	18	26	4.0	13.2	100.5	2.3	4	7.8	12	217	
" "	"	"	"	25	18	3.5	12.1	91.2	1.2	4	8.0	12	220	
Little River, above Huntington, Ind.	WLr	409	July	26	2	27.0	6.9	85.0	3.0	23	8.1	110	282	284
" "	"	"	Aug.	5		22.0	6.1	69.3	2.1	4	7.9	110	278	
" "	"	"	"	13	4	25.5	6.5	78.7	1.8	4	8.0	55	280	
" "	"	"	Nov.	5	5	12.0	9.4	86.8	1.6	9	7.8	50	264	
" "	"	"	"	12	20	3.0	9.7	72.0	3.1	460	7.8	250	207	
" "	"	"	"	18	5	5.0	13.4	104.5	0.9	5	7.7	15	272	
" "	"	"	"	25	5	5.5	12.0	95.2	1.1	4	7.8	35	284	
Little River, below Huntington, Ind.	WLr	407	Aug.	5	2	27.0	3.9	48.2	6.5	11,000	7.8	10	270	
" "	"	"	"	9		25.5	12.0	144.3	4.9	240	8.4	5	277	304
" "	"	"	"	13	5	25.5	4.0	48.4	4.2	1,100	7.8	7	288	
Wabash River, below Huntington, Ind.	W	406	July	26	53	29.5	5.0	64.4	3.2	240	8.0	60	231	268
" "	"	"	Aug.	5	26	27.0	5.1	63.2	3.5	2,400	8.0	80	236	
" "	"	"	"	13	25	27.0	4.0	49.3	3.3	460	7.8	45	232	
" "	"	"	Nov.	5	38	12.5	5.8	54.5	5.6	1,100	7.7	20	224	

TABLE W-7 WABASH RIVER BASIN

OHIO RIVER POLLUTION SURVEY
LABORATORY DATA

SUMMARY OF INDIVIDUAL RESULTS

Sampling Point	Mileage From Mouth		Date 1940		Average Discharge c.f.s.	Temp. °C	Dissolved Oxygen p.p.m.	Dissolved Oxygen % Sat.	5 Day B.O.D. p.p.m.	Coliform M.P.N. Per ml.	pH	Turbidity p.p.m.	Alkalinity p.p.m.	Hardness p.p.m.
Wabash River, below Huntington, Ind.	W	406	Nov.	12	102	2.0	10.8	78.1	4.4	460	7.9	50	238	
" "	"	"	"	18	33	4.5	13.0	99.8	2.1	460	7.8	12	233	
" "	"	"	"	25	30	4.5	11.4	88.0	1.7	1,100	8.0	12	243	
Salimonie R. 1½ mi. abv. Portland, Indiana	WSa	466	Aug.	16	**	25.0	5.5	65.6	2.1	4	8.1	100	209	220
" "	"	"	"	23	**	19.0	7.2	76.8	2.4	24	8.1	120	214	
" "	"	"	"	30	1	23.5	5.8	67.1	2.3	110	8.1	120	241	
Salimonie R. 1 mi. below Portland, Indiana	WSa	464	Aug.	16	4	25.0	0.0	00.0	8.7	24,000	7.6	30	374	344
" "	"	"	"	23	3	19.5	0.0	00.0	10.8	9,300	7.7	23	367	
" "	"	"	"	30	2	23.5	0.0	00.0	10.0	24,000	7.7	30	359	
Saligonie R. 3 mi. below Portland, Ind.	WSa	462	Aug.	16	5	25.0	0.1	1.0	11.8	46,000	7.7	17	409	348
" "	"	"	"	23	4	19.0	0.0	0.0	17.2	46,000	7.4	55	302	
" "	"	"	"	30	2	23.0	0.0	0.0	16.3	110,000	7.7	30	365	
Salimonie R. .7 mi. E. of Montpelier, Ind.	WSa	438	July	19	7	23.5	4.0	46.5	5.6	240	7.7	450	131	204
" "	"	"	"	29	3	26.5	7.9	97.1	3.4	4	8.2	45	216	
" "	"	"	Aug.	6	4	26.5	6.0	74.0	6.2	24	8.0	50	[illegible]	
Salimonie River, below Montpelier, Ind.	WSa	437	July	19	13	23.5	4.0	46.9	4.6	93	7.6	550	133	188
" "	"	"	"	29	6	27.0	2.7	33.7	3.3	93	7.6	90	212	
" "	"	"	Aug.	6	6	25.5	3.0	35.9	2.7	1,100	7.6	70	242	
Salimonie River, above Warren, Indiana	WSa	424	July	19	26	24.0	7.8	92.0	5.8	15	8.2	110	236	272
" "	"	"	"	29	9	26.5	3.2	39.7	3.9	46	8.1	95	206	
" "	"	"	Aug.	6	9	26.5	5.1	62.8	4.7	46	8.1	90	240	
Salimonie River, below Warren, Indiana	WSa	423	July	19	10	24.0	6.4	74.8	6.0	93	8.2	110	250	288
" "	"	"	"	29	10	25.5	2.1	25.4	4.8	1,100	7.7	410	146	
" "	"	"	Aug.	6	10	26.0	4.2	51.6	5.7	23	7.9	60	236	
Salimonie R. at mouth Lagro, Indiana	WSa	394	Aug.	19	37	22.0	6.3	71.5	3.6	46	8.1	210	238	268
" "	"	"	"	26	28	21.0	7.2	79.9	2.3	9	8.1	130	260	
" "	"	"	Sept	3	35	18.5	7.8	82.6	2.2	110	8.1	140	268	
" "	"	"	Nov.	5	36	13.0	9.7	91.6	1.4	9	8.1	55	271	
" "	"	"	"	12	26	3.5	10.9	82.0	4.8	240	7.8	380	181	
" "	"	"	"	18	32	5.5	13.6	107.6	1.1	9	7.7	12	279	
" "	"	"	"	25	32	4.5	13.1	100.8	1.2	7	8.3	3	278	
Wabash River, above Wabash, Indiana	W	390	July	25	87	29.5	6.1	79.2	4.2	4	8.0	120	201	284
" "	"	"	Aug.	2	60	23.5	6.4	73.8	3.1	1	8.0	85	208	
" "	"	"	"	12	45	27.0	6.3	78.1	3.6	4	8.2	120	228	
" "	"	"	Nov.	5	87	12.0	9.4	91.3	2.5	24	8.1	60	240	
" "	"	"	"	12	443	6.0	10.4	87.3	3.5	240	7.8	500	160	
Wabash River, below Wabash, Indiana	W	387	July	25	90	31.0	4.8	63.9	5.8	460	8.0	85	208	316
" "	"	"	Aug.	2	61	23.5	4.2	48.3	6.3	930	7.7	45	210	

TABLE W-7 WABASH RIVER BASIN

OHIO RIVER POLLUTION SURVEY
LABORATORY DATA

SUMMARY OF INDIVIDUAL RESULTS

Sampling Point	Mileage From Mouth	Date 1940	Average Discharge c.f.s.	Temp. °C	Dissolved Oxygen p.p.m.	Dissolved Oxygen % Sat.	5 Day B.O.D. p.p.m.	Coliform M.P.N. Per ml.	pH	Turbidity p.p.m.	Alkalinity p.p.m.	Hardness p.p.m.
Wabash River, below Wabash, Indiana	W 387	Aug. 12	45	26.5	3.9	48.2	4.4	24,000	7.8	65	232	
" "	" "	Nov. 5	88	12.5	7.0	73.6	7.6	1,500	7.7	50	238	
" "	" "	" 12	446	6.0	10.2	82.1	8.5	930	7.7	550	158	
" "	" "	" 18	84	6.5	13.0	105.4	6.0	91	7.7	35	247	
" "	" "	" 25	76	6.5	11.4	92.4	8.7	930	8.1	45	247	
Wabash River, above Peru, Indiana	W 376	July 24	107	27.0	4.6	56.8	15.2	43	7.8	120	223	280
" "	" "	Aug. 1	90	23.5	5.5	64.0	3.3	7	7.9	190	191	
" "	" "	" 9	95	23.5	4.7	54.3	3.9	15	7.7	130	240	
" "	" "	Nov. 6	100	8.5	8.0	68.0	4.2	110	7.7	22	260	
" "	" "	" 13	334	4.5	9.8	75.6	5.6	460	7.7	300	178	
" "	" "	Nov. 19	104	7.0	10.6	87.2	1.9	93	7.5	12	272	
" "	" "	" 25	110	7.5	9.2	76.7	2.6	64	7.5	35	266	
Little Mississinewa R. below Union City, Ind.	WMiLm 478	Aug. 15		24.5	2.6	30.8	11.4	2,400	8.0	15	404	332
" "	" "	" 22	**	18.5	2.9	30.3	8.7	24,000	8.1	20	450	
" "	" "	" 29	2	23.5	0.0	00.0	73.0	46,000	7.7	120	371	
Mississinewa River, above Albany, Ind.	WMi 448	Aug. 16	2	32.0	9.4	126.8	2.5	9	8.4	50	208	236
" "	" "	" 23	3	18.5	7.0	73.9	2.1	24	8.1	50	216	
" "	" "	" 30	5	23.0	5.4	62.6	2.9	46	8.1	85	224	
Mississinewa River, below Albany, Ind.	WMi 447	Aug. 16	2	29.5	7.1	92.5	6.6	3	8.4	55	222	320
" "	" "	" 23	3	19.0	7.0	75.4	2.8	24	8.1	80	220	
" "	" "	" 30	5	23.0	5.0	57.6	4.7	24	7.9	65	206	
Mississinewa River, above Eaton, Ind.	WMi 437	Aug. 16	4	29.0	7.6	98.1	2.6	4	8.1	40	224	232
" "	" "	" 23	4	21.5	8.7	97.2	2.6	9	8.2	45	216	
" "	" "	" 30	4	23.5	7.9	91.6	3.6	2	7.6	50	218	
Mississinewa River, below Eaton, Ind.	WMi 436	Aug. 16	5	29.0	5.8	74.6	5.8	4,600	8.0	55	212	224
" "	" "	" 23	5	21.5	7.7	86.0	3.6	2,400	8.1	45	208	
" "	" "	" 30	5	24.0	5.6	65.4	3.7	230	7.8	65	177	
Big Lick Creek, below Dunkirk, Ind.	WMiLi 447	Aug. 16	1	29.5	0.0	00.0	10.4	15,000	7.6	12	376	264
" "	" "	" 23	1	18.5	0.5	5.3	7.1	230	7.7	35	374	
" "	" "	" 30	1	22.0	0.0	00.0	9.1	9,300	7.8	20	339	
Big Lick Creek, above Hartford City, Ind.	WMiLi 438	Aug. 19	2	22.0	6.6	74.4	4.3	1,100	7.9	110	241	336
" "	" "	" 26	**	22.5	5.6	64.2	1.9	91	7.8	55	240	
" "	" "	Sept. 3	**	18.5	7.2	75.7	2.1	1,100	7.8	100	235	

TABLE V-7 WABASH RIVER BASIN

OHIO RIVER POLLUTION SURVEY
LABORATORY DATA

SUMMARY OF INDIVIDUAL RESULTS

Sampling Point	Mileage From Mouth	Date 1940	Average Discharge c.f.s.	Temp. °C	Dissolved Oxygen p.p.m.	Dissolved Oxygen % Sat.	5 Day B.O.D. p.p.m.	Coliforms M.P.N. Per ml	pH	Turbidity p.p.m.	Alkalinity p.p.m.	Hardness p.p.m.
Big Lick Creek, below Hartford City, Ind.	WMiLi 436	Aug. 19	4	22.0	6.3	71.7	7.0	2,400	7.9	45	234	268
" "	" "	" 26	2	23.5	0.0	00.0	15.4	15,000	7.7	25	334	
" "	" "	Sept 3	1	17.5	0.0	00.0	33.9	24,000	7.7	40	353	
Little Lick Creek, below Hartford City, Ind.	WMiLiL 437	Aug. 19	2	24.5	0.0	00.0	65.0	46,000	7.6	100	374	392
" "	" "	" 26	2	24.0	0.0	00.0	10.2	1,500	7.5	20	254	
" "	" "	Sept. 3	1	20.0	0.0	00.0	13.6	2,300	7.5	30	257	
Mississinewa River, above Gas City, Ind.	WMi 414	July 18	20	22.5	6.9	79.3	4.8	43	8.2	170	261	273
" "	" "	" 26	19	28.0	4.4	55.3	3.8	4	8.0	120	254	
" "	" "	Aug. 5	19	23.5	5.2	60.6	4.5	15	8.0	110	267	
Back Creek, 3/4 mi. below Fairmont, Indiana	WMiB 419	Aug. 19		19.0	4.3	46.0	4.1	460	7.5	45	259	280
Back Cr. 1 mi. below Fairmont, Ind.	WMiB 419	Aug. 19	2	19.5	1.4	15.0	19.3	2,400	7.[illegible]	35	229	248
" "	" "	" 26	2	21.5	2.8	30.0	9.6	430	7.6	5	380	
" "	" "	Sept. 3	2	16.5	3.3	33.5	6.4	240	7.6	5	419	
Back Creek, above Jonesboro, Ind.	WMiB 415	July 18	2	20.0	6.8	74.7	6.7	43	7.8	55	238	317
" "	" "	" 26	2	25.5	2.9	35.2	5.7	43	7.8	40	269	
" "	" "	Aug. 5	2	21.0	3.3	37.0	7.4	93	7.7	30	289	
Mississinewa River, above Marion, Ind.	WMi 413	July 18	60	25.5	11.6	140.0	6.6	46	8.4	190	226	268
" "	" "	" 26	23	28.0	6.8	85.9	5.6	93	7.9	110	243	
" "	" "	Aug. 5	21	23.5	4.4	50.7	8.7	23	8.1	110	272	
Mississinewa River, below Marion, Ind.	WMi 403	July 26	54	27.5	2.0	25.5	7.8	460	7.8	4	252	332
" "	" "	Aug. 5	46	24.0	4.0	46.9	2.8	9	7.9	8	272	
" "	" "	" 13	36	27.0	2.8	34.9	2.8	2	8.2	13	292	
Mississinewa River, at mouth, Peru, Indiana	WMi 376	July 24	62	26.5	3.7	45.5	5.2	43	7.8	95	201	260
" "	" "	Aug. 1	42	24.5	6.9	81.9	4.9	4	8.1	40	212	
" "	" "	" 9	42	23.5	5.4	62.8	3.6	2	8.0	90	226	
" "	" "	Nov. 6	50	7.5	10.5	87.5	3.9	1	8.1	20	254	
" "	" "	Nov. 13	75	1.5	12.8	91.1	3.8	3	8.1	40	242	
" "	" "	" 19	50	4.5	13.3	102.6	2.1	1	8.1	5	253	
" "	" "	" 25	50	5.5	13.7	108.4	1.7	**	8.2	3	254	
Wabash River, below Peru, Indiana	W 370	July 24	174	27.0	5.4	66.7	6.1	43	8.0	140	204	288
" "	" "	Aug. 1	140	24.5	7.0	82.6	3.4	43	8.1	90	218	
" "	" "	" 9	140	23.5	5.3	61.3	3.8	460	7.9	100	241	
" "	" "	Nov. 6	150	8.0	10.0	84.2	5.2	460	7.7	40	254	
" "	" "	" 13	412	3.5	10.5	78.9	6.7	430	7.7	130	218	
" "	" "	" 10	165	5.5	11.4	89.9	3.5	93	7.7	12	257	
" "	" "	" 25	170	6.5	14.9	127.2	2.9	150	7.9	5	260	
Wabash River, above Logansport, Ind.	W 357	Sept. 30	115	16.5	13.3	135.0	8.8	4	8.4	100	203	260
" "	" "	Oct. 4	200	17.5	13.2	136.9	7.1	2	8.4	60	194	
" "	" "	" 9	248	11.5	8.1	73.9	3.8	110	8.1	60	178	
" "	" "	Nov. 6	250	8.0	12.2	102.6	5.1	9	8.1	50	244	

TABLE V-7 WABASH RIVER BASIN

OHIO RIVER POLLUTION SURVEY
LABORATORY DATA

SUMMARY OF INDIVIDUAL RESULTS

Sampling Point	Mileage From Mouth		Date 1940		Average Discharge c.f.s.	Temp. °C	Dissolved Oxygen p.p.m.	Dissolved Oxygen % Sat.	5 Day B.O.D. p.p.m.	Coliform M.P.N. Per ml	pH	Turbidity p.p.m.	Alkalinity p.p.m.	Hardness p.p.m.
Wabash River, above Logansport, Ind.	W	357	Nov.	13	1,030	2.0	13.1	94.7	3.0	23	8.1	35	244	
" "	"	"	"	19	213	5.5	13.2	104.5	2.7	43	7.8	65	215	
" "	"	"	"	26	264	2.0	13.0	94.0	3.1	23	8.1	100	251	
Town Branch Eel River, below Churubusco, Ind.	WEeTb	443	July	23	**	26.5	0.0	00.0	29.2	46,000	7.3	210	153	136
" "	"	"	"	31	**	22.5	0.1	1.3	18.7	24,000	7.7	85	510	
" "	"	"	Aug.	8	**	17.0	2.0	20.9	13.6	4,300	7.8	200	499	
Eel River, below Churubusco, Ind.	WEe	438	July	23	1	25.5	2.0	24.2	1.6	36	7.8	5	308	240
" "	"	"	"	31	1	23.5	2.1	24.4	1.6	21	7.5	7	264	
" "	"	"	Aug.	8	1	19.0	2.6	28.0	1.4	24	7.5	7	336	
Thorn Creek, above Columbia City, Ind.	WEeTh	427	July	23	7	23.5	3.5	40.2	3.0	1,100	7.7	100	261	244
" "	"	"	"	31	7	22.5	3.5	39.7	3.5	930	7.8	12	296	
" "	"	"	Aug.	8	6	19.0	7.2	76.6	1.6	43	7.9	12	320	
Thorn Creek, below Columbia City, Ind.	WEeTh	425	July	23	7	24.5	1.6	19.3	8.2	4,600	7.7	330	217	264
" "	"	"	"	31	8	24.0	0.0	00.0	36.6	24,000	7.6	100	361	
" "	"	"	Aug.	6	7	20.0	0.0	00.0	80.8	110,000	7.7	160	394	
Eel River, above South Whitley, Ind.	WEe	413	July	23	75	24.5	2.9	34.6	7.6	2,400	7.7	450	214	252
" "	"	"	"	31	30	28.5	4.0	50.4	3.1	91	7.9	25	304	
" "	"	"	Aug.	8	23	21.0	3.4	38.2	6.6	2,400	7.8	18	329	
Eel River, below South Whitley, Ind.	WEe	412	July	23	67	27.0	5.6	69.0	3.9	460	7.8	80	260	296
" "	"	"	"	31	40	23.5	6.9	80.0	3.2	36	7.9	70	282	
" "	"	"	Aug.	8	30	22.5	7.0	79.1	2.6	46	8.0	45	313	
Eel River, above N. Manchester, Ind.	WEe	400	July	23	152	27.0	9.3	115.6	3.6	46	7.8	25	260	212
" " "	"	"	"	31	56	24.5	5.2	61.2	2.0	23	7.8	95	226	
" "	"	"	Aug.	8	31	23.0	6.8	77.9	2.7	93	8.0	55	299	
Eel River, below N. Manchester, Ind.	WEe	398	July	23	148	27.5	6.7	83.9	2.4	210	8.1	35	281	220
" "	"	"	"	31	73	25.0	5.2	61.8	2.5	460	7.7	110	204	
" "	"	"	Aug.	8	44	24.0	9.9	115.6	4.4	240	8.2	80	277	
Eel River, above Logansport Ind.	WEe	357	Sept.	30	105	15.5	10.6	105.4	2.2	9	8.1	17	263	268
" "	"	"	Oct.	4	100	15.0	9.9	97.4	1.4	24	8.1	18	260	
" "	"	"	"	9	252	14.5	7.5	73.1	2.5	46	8.0	60	236	
" "	"	"	Oct.	11	167	16.0	8.5	85.4	1.9	23	7.9	40	216	
" "	"	"	"	16	153	11.5	8.8	80.1	1.9	9	7.8	55	231	
" "	"	"	Nov.	6	177	7.5	10.5	87 5	1.4	4	7.7	12	270	
" "	"	"	"	13	300	3.0	12.5	92.4	1.1	15	8.1	70	276	
" "	"	"	"	19	186	5.0	13.3	104.2	1.3	110	7.9	30	217	
" "	"	"	"	26	178	4.0	12.8	97.5	1.2	4	8.1	35	276	
Wabash R. 1½ mi. below Logansport, Ind.	W	354	Sept.	30	220	17.5	11.8	122.0	2.9	93	8.3	15	252	264
" "	"	"	Oct.	4	300	17.0	10.3	105.5	5.0	350	8.1	20	222	

TABLE W-7 WABASH RIVER BASIN

OHIO RIVER POLLUTION SURVEY
LABORATORY DATA

SUMMARY OF INDIVIDUAL RESULTS

Sampling Point	Mileage From Mouth	Date 1940	Average Discharge c.f.s.	Temp °C	Dissolved Oxygen p.p.m.	Dissolved Oxygen % Sat.	5 Day B.O.D. p.p.m.	Coliforms M.P.N. Per ml	pH	Turbidity p.p.m.	Alkalinity p.p.m.	Hardness p.p.m.
Wabash River 1½ miles below Logansport, Ind.	W 354	Oct. 9	500	13.3	7.3	69.5	5.5	350	7.8	45	230	
" "	" "	Nov. 6	427	9.5	10.2	89.1	2.1	460	8.0	7	276	
" "	" "	" 13	1,330	3.0	13.0	96.3	3.3	93	8.1	50	290	
" "	" "	Oct. 11	320	17.3	9.1	94.0	2.8	305	8.1	12	225	
" "	" "	" 16	360	11.8	8.1	74.1	3.1	670	7.8	35	214	
" "	" "	Nov. 19	410	5.5	11.7	92.6	3.5	240	7.8	30	225	
" "	" "	" 26	447	2.0	11.3	81.8	3.2	1,100	8.0	12	231	
Wabash River, Georgetown, Indiana	W 349	Oct. 3	310	15.5	8.4	84.1	4.0	43	8.1	45	228	264
" "	" "	" 4	310	16.5	10.7	113.1	4.6	142	8.2	40	230	
" "	" "	" 9	520	14.3	7.5	72.8	3.4	195	7.9	40	228	
" "	" "	" 16	377	12.0	8.4	77.6	3.8	350	8.0	60	214	
" "	" "	Nov. 6	436	8.0	11.0	92.8	2.7	240	8.1	35	214	
" "	" "	" 13	1,340	2.0	13.2	95.4	3.4	460	8.1	85	267	
" "	" "	" 19	421	6.0	12.8	102.6	2.3	1,100	8.0	60	218	
" "	" "	" 26	457	3.0	12.9	95.8	2.8	240	8.2	18	292	
Wabash River, above Delphi, Indiana	W 332	Oct. 1	240	17.5	11.4	117.9	4.6	9	8.4	60	209	236
" "	" "	" 8	462	16.5	7.6	76.9	3.8	460	7.9	110	184	
" "	" "	" 9	581	16.0	9.6	96.2	3.7	93	8.4	75	192	
" "	" "	" 15	370	14.5	9.1	88.5	2.0	9	8.1	60	199	
" "	" "	" 16	429	13.0	10.2	96.5	2.4	93	8.1	65	212	
" "	" "	Nov. 7	448	6.5	11.8	95.8	2.6	240	8.1	30	250	
" "	" "	" 14	1045	0.0	13.8	94.5	2.2	93	8.1	50	250	
" "	" "	" 20	455	6.0	12.9	108.4	1.6	150	8.1	70	218	
" "	" "	" 26	483	2.5	13.6	99.5	2.1	23	8.2	12	246	
Wabash River, below Delphi, Indiana	W 330	Oct. 1	241	18.5	14.3	151.5	4.6	43	8.4	50	216	256
" "	" "	" 8	474	17.0	7.5	77.0	4.6	240	7.7	90	182	
" "	" "	" 9	597	16.0	9.6	96.8	3.8	93	8.0	45	185	
" "	" "	" 15	382	14.0	6.5	62.7	5.7	2,400	7.8	1,200	132	
Tippecanoe River above Warsaw, Ind.	WT1 443	July 22	39	25.5	6.9	82.8	2.0	43	8.0	3	180	208
" "	" "	" 30	25	27.5	6.9	86.2	2.4	4	8.0	5	192	
" "	" "	Aug. 7	17	21.5	7.4	83.6	1.6	120	8.1	3	200	
Walnut Creek, above Warsaw, Indiana	WT1Wc 444	July 22	2	28.5	11.0	139.8	2.6	46	8.7	3	213	172
" "	" "	" 30	2	28.5	10.8	137.8	2.0	9	8.4	3	184	
" "	" "	Aug. 7	2	22.5	11.5	131.1	1.2	24	8.4	3	218	
Walnut Creek, below Warsaw, Indiana	WT1Wc 443	July 22	5	24.5	0.0	00.0	53.4	240,000	7.5	55	237	252
" "	" "	" 30	5	26.0	0.0	00.0	40.7	460,000	7.1	20	227	
" "	" "	Aug. 7	4	22.5	0.0	00.0	41.6	150,000	7.3	50	262	
Tippecanoe River, below Warsaw, Indiana	WT1 442	July 22	45	26.0	5.3	65.0	4.4	39	7.9	3	191	220
" "	" "	" 30	30	27.0	3.8	47.2	3.0	43	7.7	3	191	
" "	" "	Aug. 7	22	23.0	3.3	37.8	2.3	93	7.7	3	204	

TABLE V-7 WABASH RIVER BASIN

OHIO RIVER POLLUTION SURVEY
LABORATORY DATA

SUMMARY OF INDIVIDUAL RESULTS

Sampling Point	Mileage from Mouth	Date 1940	Average Discharge c.f.s.	Temp. °C	Dissolved Oxygen		5 Day B.O.D. p.p.m.	Coliform M.P.N. Per ml	pH	Turbidity p.p.m.	Alkalinity p.p.m.	Hardness p.p.m.
					p.p.m.	% Sat.						
Winona Lake Outlet, Warsaw, Indiana	WTiMcWl 444	July 22	2	27.5	8.7	108.8	2.4	9	8.7	5	100	275
" "	" "	" 30	2	30.5	8.1	107.4	2.0	2	8.7	5	101	
" "	" "	Aug. 7	1	25.0	7.8	92.6	1.8	11	8.4	3	96	
Tippecanoe River, above Bourbon, Ind.	WTi 432	July 22	75	26.0	4.9	59.2	4.4	23	7.9	10	207	244
" "	" "	" 30	70	27.5	4.8	60.3	2.0	43	8.0	10	191	
" "	" "	Aug. 7	40	23.5	5.8	67.4	1.8	23	8.0	7	210	
Tippecanoe River, below Bourbon, Ind.	WTi 422	July 22	82	26.5	3.6	43.6	4.0	4	8.1	5	216	230
" "	" "	" 30	74	27.5	5.1	63.8	2.1	3	8.0	4	208	
" "	" "	Aug. 7	50	23.5	5.9	68.6	1.8	4	8.1	3	220	
Tippecanoe River, above Rochester, Ind.	WTi 410	July 24	116	27.0	5.8	72.4	2.3	9	8.0	3	214	264
" "	" "	Aug. 1	96	22.0	5.7	64.6	0.9	4	8.0	3	213	
" "	" "	" 9	96	23.0	6.4	74.1	1.3	7	8.0	3	226	
Mill Creek, above Rochester, Ind.	WTiMc 411	July 24	9	23.5	3.8	44.7	7.8	93	7.6	3	196	208
" "	" "	Aug. 1	4	19.0	3.9	41.4	3.1	4	7.7	7	123	
" "	" "	" 9	4	21.5	4.6	51.9	1.8	4	7.7	3	167	
Mill Creek, below Rochester, Indiana	WTiMc 409	July 24	11	21.0	2.0	22.4	3.2	930	7.5	3	200	236
" "	" "	Aug. 1	11	14.5	2.6	25.1	2.7	430	7.5	3	203	
" "	" "	" 9	10	20.0	2.9	31.3	2.3	430	7.5	2	217	
Tippecanoe River, below Rochester, Indiana	WTi 408	July 24	128	25.0	4.5	53.7	2.0	93	7.8	3	207	260
" "	" "	Aug. 1	107	19.0	4.8	51.3	1.7	93	7.8	3	213	
" "	" "	" 9	107	21.5	5.5	61.7	1.5	93	7.8	2	220	
Lake Maxinkuckee, 100' below Culver sewer		July 22		26.5	6.3	77.9	2.7	4	8.2	3	122	146
" "		" 30		29.0	6.2	79.5	1.8	**	8.4	3	115	
" "		Aug. 7		25.5	5.3	62.4	1.8	11	8.1	2	122	
Lake Maxinkuckee, 900' below sewer		July 22		26.5	7.8	95.8	2.2	4	8.6	3	122	
Tippecanoe River, above Winamac, Ind.	WTi 377	Sept. 30	100	15.0	9.2	90.8	1.6	4	8.1	2	223	236
" "	" "	Oct. 4	96	16.0	8.6	86.3	1.1	9	8.1	2	200	
" "	" "	" 11	128	15.5	8.3	82.6	1.2	4	7.9	3	198	
Tippecanoe River, below Winamac, Ind.	WTi 375	Sept. 30	100	14.5	9.0	87.3	1.5	23	8.1	2	223	224
" "	" "	Oct. 4	96	15.5	8.2	81.6	1.0	43	8.1	2	202	
" "	" "	" 11	128	15.0	8.0	79.3	1.4	15	7.9	3	195	
Tippecanoe River, above Monticello, Indiana	WTi 349	Sept. 30	193	19.5	8.5	91.5	1.9	4	8.1	12	191	240
" "	" "	Oct. 4	195	17.0	7.9	81.1	1.4	4	7.9	17	198	
" "	" "	" 11	375	17.0	7.2	73.9	2.0	9	8.0	7	195	
Tippecanoe River, below Monticello, Ind.	WTi 347	Sept. 30	193	19.5	10.7	115.6	3.0	4	8.4	12	201	236
" "	" "	Oct. 4	195	17.0	8.4	86.3	1.6	4	8.1	15	171	
" "	" "	" 11	375	17.0	9.3	95.0	2.1	24	8.3	7	193	

TABLE W-7 WABASH RIVER BASIN

OHIO RIVER POLLUTION SURVEY
LABORATORY DATA

SUMMARY OF INDIVIDUAL RESULTS

Sampling Point	Mileage From Mouth		Date 1940		Average Discharge c.f.s.	Temp. °C	Dissolved Oxygen p.p.m.	Dissolved Oxygen % Sat.	5 Day B.O.D. p.p.m.	Coliform M.P.N. Per ml.	pH	Turbidity p.p.m.	Alkalinity p.p.m.	Hardness p.p.m.
Tippecanoe River, 3 miles above mouth	WTi	325	Oct.	1	224	18.0	11.1	116.7	1.9	15	8.3	3	182	228
" "	"	"	"	8	425	17.0	9.0	92.0	2.0	46	8.1	10	186	
" "	"	"	"	9	400	17.0	9.2	95.0	2.2	46	8.2	10	175	
" "	"	"	"	16	268	14.0	9.7	93.6	1.5	23	8.1	12	186	
" "	"	"	Nov.	7	257	7.5	10.7	88.7	1.9	9	8.0	3	197	
" "	"	"	"	14	395	2.0	12.2	88.2	1.5	4	8.1	5	197	
" "	"	"	"	20	395	9.0	11.6	100.3	1.1	4	8.1	5	191	
" "	"	"	"	26	410	3.5	12.6	94.6	2.6	4	8.1	3	195	
Wildcat Creek, above Greentown, Ind.	WWc	382	July	25	4	27.0	2.9	35.4	5.0	4	7.7	50	264	272
" "	"	"	Aug.	2	2	20.0	4.2	46.0	2.2	24	7.6	20	255	
" "	"	"	"	12	2	25.5	4.1	49.3	2.0	24	7.9	40	266	
Wildcat Creek, below Greentown, Indiana	WWc	381	July	25	5	27.0	4.9	61.0	4.5	4	8.1	40	254	280
" "	"	"	Aug.	2	3	21.0	5.0	55.2	2.2	15	7.9	18	272	
" "	"	"	"	12	3	25.5	6.2	74.7	2.1	4	8.0	8	274	
Wildcat Creek, above Kokomo, Ind.	WWc	373	July	18	10	22.0	4.7	53.3	3.7	23	7.8	60	252	
" "	"	"	"	25	8	27.0	3.6	44.9	5.1	9	7.9	60	264	268
" "	"	"	Aug.	2	4	20.0	4.6	50.6	4.9	9	8.0	70	274	
Kokomo Creek, above Kokomo, Indiana	WWcK	373	July	18		22.0	7.8	87.9	3.2	3	8.1	15	231	225
Wildcat Creek, below Kokomo, Ind.	WWc	371	July	18	10	24.5	1.7	19.9	3.6	640	7.5	55	302	312
" "	"	"	"	25	10	27.0	0.8	9.9	4.5	2,400	7.2	90	282	264
" "	"	"	Aug.	2	8	20.0	0.4	3.9	3.6	11,000	7.2	90	290	
Prairie Creek, below Frankfort, Indiana	WWcSfP	349	Oct.	1	3	16.5	0.1	0.8	41.[illegible]	240,000	7.6	30	418	300
" "	"	"	"	8	4	14.5	3.8	37.4	11.3	15,000	7.6	10	264	
" "	"	"	"	15	4	13.5	3.1	29.9	14.1	9,300	7.3	50	140	
Wildcat Creek, 2½ mi. above mouth	WWc	319	Oct.	1	49	17.0	13.6	139.8	3.2	75	8.4	23	250	256
" "	"	"	"	8	84	16.0	8.1	81.6	4.0	2,400	7.8	150	206	
" "	"	"	Oct.	9	64	15.5	8.8	88.1	3.3	93	8.0	70	202	
" "	"	"	"	15	600	14.5	7.6	74.3	6.9	4,600	7.7	1,500	96	
" "	"	"	"	16	400	14.5	9.1	88.6	3.9	230	7.6	900	126	
" "	"	"	Nov.	7	88	7.0	11.2	92.0	1.1	9	8.1	7	256	
" "	"	"	"	14	108	0.0	13.7	93.7	1.4	43	8.1	40	259	
" "	"	"	"	20	100	7.5	12.0	99.9	0.7	4	8.1	10	278	
" "	"	"	"	26	97	3.0	12.7	94.4	1.6	3	8.0	17	261	
Wabash River, above W. Lafayette, Ind.	W	313.5	Oct.	3	603	17.0	9.2	94.6	2.0	75	8.1	27	204	252
" " "	"	"	"	10	1,040	15.5	9.6	95.4	2.6	150	8.1	45	187	
" "	"	"	"	15	1,800	14.5	9.3	90.6	5.3	75	8.1	45	199	
" "	"	"	"	17	1,030	16.0	10.9	109.1	6.8	210	8.0	180	214	
" "	"	"	Nov.	7	1,000	8.0	11.2	94.4	2.5	460	8.1	18	228	
" " "	"	"	"	14	1,760	0.0	13.4	91.5	2.1	43	8.1	65	235	
" "	"	"	"	20	1,030	7.0	12.2	99.8	1.1	9	8.1	22	234	
" "	"	"	"	22	1,030	10.5	11.9	106.1	2.5	240	8.1	12	216	

TABLE W-7 WABASH RIVER BASIN

OHIO RIVER POLLUTION SURVEY
LABORATORY DATA

SUMMARY OF INDIVIDUAL RESULTS

Sampling Point		Mileage From Mouth		Date 1940	Average Discharge c.f.s.	Temp. °C	Dissolved Oxygen p.p.m.	% Sat.	5 Day B.O.D. p.p.m.	Coliform M.P.N. Per ml	pH	Turbidity p.p.m.	Alkalinity p.p.m.	Hardness p.p.m.
Wabash River, below West Lafayette, Ind.		W	310	Oct. 3	608	17.0	9.2	95.0	3.5	670	8.1	17	210	256
"	"	"	"	" 10	1,040	16.8	7.9	80.6	3.2	460	7.9	35	192	
"	"	"	"	" 15	1,805	15.5	6.7	66.8	4.3	1,280	7.7	240	208	
"	"	"	"	" 17	1,030	13.5	9.4	90.2	3.1	240	7.9	85	182	
"	"	"	"	Nov. 7	1,010	6.5	10.3	87.7	3.9	460	8.1	18	236	
"	"	"	"	" 14	1,770	1.5	13.2	94.1	3.9	460	8.1	55	240	
"	"	"	"	" 20	1,040	6.0	11.2	94.0	5.1	1,100	8.0	20	225	
"	"	"	"	" 22	1,040	9.5	10.4	90.6	3.0	210	7.9	12	220	
Wabash River, 8 mi. below W. Lafayette, Ind.		W	303	Oct. 3	618	17.6	8.4	87.8	3.5	710	8.0	15	216	256
"	"	"	"	" 10	1,040	15.5	7.4	73.3	3.0	240	7.6	35	185	
"	"	"	"	" 15	1,810	14.8	6.3	62.1	4.5	3,050	7.7	600	152	
"	"	"	"	" 17	1,110	13.0	8.7	82.0	2.3	1,250	7.8	110	179	
"	"	"	"	Nov. 7	1,014	6.5	11.7	91.2	3.4	430	8.1	20	235	
"	"	"	"	" 14	1,780	3.0	12.9	95.7	2.5	240	8.1	50	236	
"	"	"	"	" 20	1,040	8.0	11.5	97.2	[illegible]	93	8.1	25	229	
"	"	"	"	" 22	1,040	9.5	10.4	91.0	1.8	240	7.9	40	227	
Wabash River, Independence, Ind.		W	294	Oct. 2	637	18.0	11.9	124.7	2.8	1,100	8.2	12	211	252
"	"	"	"	" 7	964	18.5	6.7	71.0	3.9	460	7.8	130	184	
"	"	"	"	" 10	1,040	14.0	7.1	68.9	2.3	93	7.7	30	185	
"	"	"	"	" 14	755	17.5	7.9	82.0	1.4	43	7.9	12	208	
"	"	"	"	" 17	1,220	13.5	7.6	72.8	2.2	240	7.7	110	177	
Wabash River, above Attica, Indiana		W	288	Oct. 2	644	17.0	12.1	124.4	3.5	122	8.2	12	177	252
"	"	"	"	" 7	973	17.8	7.0	73.0	4.9	460	7.9	150	191	
"	"	"	"	" 10	1,050	13.3	7.0	66.3	2.4	68	7.7	30	179	
"	"	"	"	" 14	771	17.5	8.2	85.0	1.9	68	7.8	25	211	
"	"	"	"	" 17	1,240	13.8	7.8	75.2	2.6	122	7.7	150	164	
"	"	"	"	Nov. 8	952	9.0	12.0	103.2	3.5	93	8.1	20	237	
"	"	"	"	" 15	2,000	3.5	13.3	100.2	3.3	93	8.1	50	231	
"	"	"	"	" 22	1,080	9.5	10.9	94.9	1.9	43	7.9	12	223	
Wabash River, below Williamsport, Ind.		W	286	Oct. 2	644	16.0	10.8	108.3	4.0	93	8.1	27	189	260
"	"	"	"	" 7	940	18.3	6.9	72.8	5.0	1,750	7.7	280	179	
"	"	"	"	" 14	771	17.0	8.1	82.8	2.4	195	7.6	23	213	
"	"	"	"	Nov. 8	954	10.0	11.8	104.1	3.9	93	8.1	40	235	
"	"	"	"	" 15	2,000	4.5	13.3	102.5	2.7	93	8.1	70	233	
"	"	"	"	" 22	1,090	9.0	10.6	91.6	2.3	43	7.9	15	230	
Wabash River, above Covington, Indiana		W	271	Oct. 2	679	14.5	10.3	100.0	3.1	13	8.1	40	182	252
"	"	"	"	" 7	994	17.5	7.3	75.9	3.8	460	7.9	390	176	
"	"	"	"	" 14	842	17.0	9.2	94.4	2.0	43	8.1	50	250	
Wabash River, below Covington, Indiana		W	270	Oct. 2	679	14.5	10.2	99.9	2.8	13	8.1	40	186	252
"	"	"	"	" 7	994	17.3	7.2	74.6	4.9	670	7.9	290	180	
"	"	"	"	" 14	842	16.5	9.1	92.0	2.5	132	8.0	50	209	

TABLE W-7 WABASH RIVER BASIN

OHIO RIVER POLLUTION SURVEY
LABORATORY DATA

SUMMARY OF INDIVIDUAL RESULTS

Sampling Point	Mileage From Mouth	Date 1940	Average Discharge c.f.s.	Temp. °C	Dissolved Oxygen		5 Day B.O.D. p.p.m.	Coliform M.P.N. Per ml	pH	Turbidity p.p.m.	Alkalinity p.p.m.	Hardness p.p.m.
					p.p.m.	% Sat.						
Wabash River, Perrysville, Ind.	W 264	Sept. 25	740	15.5	8.6	85.6	3.1	23	8.2	15	210	
" "	" "	Oct. 2	680	15.0	9.1	89.9	1.5	9	6.1	15	211	227
" "	" "	" 7	994	17.0	6.8	69.6	3.9	240	7.8	400	159	
" "	" "	Nov. 8	1,030	8.0	12.5	105.5	3.3	93	8.2	50	233	
" "	" "	" 15	2,120	2.0	13.4	96.6	2.4	240	6.1	40	233	
" "	" "	" 22	1,150	8.0	11.0	92.8	1.5	43	7.9	17	232	
Glen Creek, below Paxton, Ill.	WVMfEbGl 342	July 24	**	35.0	5.7	60.9	11.6	910	8.0	70	418	165
" "	" "	" 29	**	28.0	2.4	30.3	22.5	2,100	7.8	91	444	
" "	" "	Aug. 1	**	23.5	3.7	43.3	24.2	24,000	7.7	77	387	
Glen Creek, below Paxton, Ill.	WVMfEbGl 339	July 24	**	30.0	6.3	82.4	5.6	43	7.8	200	297	142
" "	" "	" 29	**	30.0	3.2	41.4	14.0	240	7.7	430	241	
" "	" "	Aug. 1	**	24.5	9.4	111.0	11.5	240	8.3	13[illegible]	282	
Middle Fork Vermilion R. below Paxton, Ill.	WVMf 330	July 24	1	26.5	6.9	88.0	1.7	23	7.7	10	192	123
" "	" "	" 29	1	32.0	9.1	123.0	2.9	15	8.3	10	184	
" "	" "	Aug. 1	1	28.0	9.0	113.9	2.2	9	8.4	25	162	
Salt Fork Vermilion R. above Rantoul, Ill.	WVSt 339	July 25	1	28.0	7.2	90.4	1.3	110	7.9	57	258	
" "	" "	" 30	1	22.5	7.1	81.4	1.3	93	7.9	5	264	185
" "	" "	Aug. 2	1	19.5	7.8	84.6	1.7	240	7.9	5	262	
Salt Fork, below Rantoul, Illinois	WVSt 338	July 25	2	29.5	3.6	47.0	9.5	430	7.8	5	299	
" "	" "	" 30	2	22.0	1.5	17.0	9.8	4,300	7.6	5	326	183
" "	" "	Aug. 2	2	19.5	1.8	18.9	18.2	2,300	7.6	5	314	
Salt Fork, 3 miles below Rantoul, Ill.	WVSt 336	July 25	4	32.0	11.3	152.8	7.0	930	8.4	5	305	
" "	" "	" 30	4	27.0	10.1	124.8	4.3	4,600	8.3	5	319	187
" "	" "	Aug. 2	4	22.5	9.7	110.8	7.2	2,400	8.1	5	313	
Town Br. Salt Fork below Chanute Field	WVStTb 339	July 25	1	25.0	5.6	66.2	5.9	4,600	8.2	170	376	
" "	" "	" 30	1	22.5	3.9	44.1	45.2	2,300	7.7	10	372	170
" "	" "	Aug. 2	1	20.5	3.6	39.9	27.3	750	7.7	5	371	
Town Branch, 3 miles below Chanute Field	WVStTb 337	July 25	1	28.0	5.0	63.3	6.0	93	8.1	71	396	
" "	" "	" 30	1	27.0	4.9	61.2	19.0	930	8.0	200	366	191
" "	" "	Aug. 2	1	21.5	6.3	71.0	17.2	930	8.1	205	372	"
W. Br. Salt Fork above Champaign & Urbana	WVStWb 333	July 25	1	32.5	9.7	132.4	3.1	9	8.1	5	198	81
" "	" "	" 30	1	30.5	5.4	71.3	2.8	43	8.1	99	209	
" "	" "	Aug. 2	1	26.0	5.8	70.7	2.6	93	8.0	104	207	
W. Br. Salt Fork, below Champaign & Urbana	WVStWb 330	July 25	12	27.5	7.4	91.6	10.4	2,300	7.8	5	299	
" "	" "	" 30	12	27.0	9.1	113.0	12.5	4,600	7.9	10	310	127
" "	" "	Aug. 2	11	24.0	8.7	101.9	8.7	2,400	8.0	5	300	

TABLE V-7 WABASH RIVER BASIN

OHIO RIVER POLLUTION SURVEY
LABORATORY DATA

SUMMARY OF INDIVIDUAL RESULTS

Sampling Point	Mileage From Mouth	Date 1940	Average Discharge c.f.s.	Temp. °C	Dissolved Oxygen p.p.m.	Dissolved Oxygen % Sat.	5 Day B.O.D. p.p.m.	Coliform M.P.N. Per ml.	pH	Turbidity p.p.m.	Alkalinity p.p.m.	Hardness p.p.m.
W. Br. Salt Fork, 5 mi. below Champaign & Urbana	WVStWb 324	July 25	12	35.0	15.4	219.4	6.1	2	8.4	5	349	149
" "	" "	" 30	12	33.5	20.4	283.6	5.1	110	9.1	10	330	
" "	" "	Aug. 2	12	28.5	20.4	260.8	5.9	24	8.8	5	323	
Salt Fork, above Danville, Ill.	WVSt 277	July 26	49	34.0	7.5	104.8	2.8	36	8.2	5	235	123
" "	" "	" 31	54	31.0	8.1	107.3	1.9	9	8.2	5	232	
" "	" "	Aug. 2	49	29.0	7.6	98.2	1.6	9	8.2	5	232	
N. Fk. Vermilion River above Hoopeston, Ill.	WVNf 311	July 24	4	29.0	5.7	73.5	2.3	23	7.6	97	232	
" "	" "	" 29	3	27.5	4.7	59.1	3.2	93	7.9	86	231	159
" "	" "	Aug. 1	4	23.9	4.7	54.9	3.4	23	7.9	100	213	
N. Fk. Vermilion River below Hoopeston, Ill.	WVNf 305	July 24	4	30.5	8.3	109.4	3.9	43	8.1	48	261	
" "	" "	" 29	4	26.0	5.5	66.7	3.3	240	8.1	42	290	152
" "	" "	Aug. 1	4	22.5	4.8	55.2	3.8	240	8.0	40	260	--- ---
N. Fk. Vermilion River below Rossville, Ill.	WVNf 301	July 24	5	30.5	8.7	114.4	6.0	23	8.3	49	267	
" "	" "	" 29	4	26.0	5.1	61.8	2.6	43	8.0	37	276	102
" "	" "	Aug. 1	4	22.5	5.4	62.1	2.3	460	8.1	43	275	
N. Fk. Vermilion River above Danville, Ill.	WVNf 278	July 26		32.0	8.9	120.3	2.6	3	8.3	5	191	99
" "	" "	" 29		32.5	7.6	104.4	1.3	2	8.2	10	186	
" "	" "	Aug. 1	142	26.0	6.6	80.0	1.5	21	8.2	10	197	
Vermilion R. 1 mi. below Danville, Ill.	WV 273	July 26	36	31.5	4.0	54.4	9.3	46,000	8.2	10	245	181
" "	" "	" 31	36	28.0	0.0	00.0	22.6	93,000	7.6	36	248	
" "	" "	Aug. 5	25	27.0	4.0	50.2	8.2	9,300	8.0	5	219	
Grape Creek, 1/2 mi. below Danville, Ill.	WVGr 276	July 26	**	30.5	8.8	115.9	0.8	110	8.2	5	155	117
" "	" "	" 31	**	28.5	8.1	103.2	1.2	9	7.6	10	105	
Grape Creek, below Danville, Ill.	WVGr 274	July 26	1	32.5	7.4	101.8	0.8	24	7.5	5	109	151
" "	" "	" 31	1	27.5	9.6	119.6	2.6	93	8.2	5	155	
Grape Creek, below Westville, Ill.	WVGr 273	July 26	1	22.5	8.8	100.0	1.4	110	7.9	5	407	179
" "	" "	" 31	1	20.0	9.8	107.3	1.2	29	8.0	5	405	
" "	" "	Aug. 5	1	[illegible]	9.3	101.6	1.3	43	7.8	5	408	
Vermilion River 4½ mi. below Danville	WV 268	July 26	50	21.0	5.5	73.0	3.0	43	7.9	5	242	152
" "	" "	" 31	55	27.0	6.2	76.7	3.8	460	8.1	5	251	
" "	" "	Aug. 5	50	27.0	4.5	55.5	3.4	23	7.9	5	233	
Vermilion River 1/2 mi above mouth	Wv 258	Sept. 25	82	14.5	7.7	75.0	2.7	46	7.9	10	227	
" "	" "	Oct. 2	82	13.5	9.5	91.0	2.2	4	8.1	5	236	169
" "	" "	" 7	126	17.0	5.2	53.6	8.4	240	7.6	650	157	
" "	" "	Nov. 8	100	7.0	9.6	78.7	3.8	43	7.7	2	264	
" "	" "	" 15	90	3.5	12.1	90.9	4.7	2,400	7.7	35	225	
" "	" "	" 22	63	8.5	8.5	72.3	1.8	93	7.7	3	268	

TABLE V-7 WABASH RIVER BASIN

OHIO RIVER POLLUTION SURVEY
LABORATORY DATA

SUMMARY OF INDIVIDUAL RESULTS

Sampling Point	Mileage from Mouth		Date 1940	Average Discharge c.f.s.	Temp. °C	Dissolved Oxygen p.p.m.	Dissolved Oxygen % Sat.	5 Day B.O.D. p.p.m.	Coliform M.P.N. Per ml	pH	Turbidity p.p.m.	Alkalinity p.p.m.	Hardness p.p.m.
Wabash River, Cayuga, Ind.	W	256	Sept. 25	840	15.5	7.7	76.6	2.8	9	8.1	20	202	
" "	"	"	Oct. 2	765	14.0	9.0	86.3	1.8	24	8.1	10	212	164
" "	"	"	" 7	1,120	18.0	7.0	73.4	3.0	1,100	8.0	230	163	
Little Vermilion R, below Georgetown, Ill.	WLv	269	July 26	3	27.5	3.6	45.1	1.3	4	8.0	34	232	129
" "	"	"	" 31	2	26.5	5.0	61.7	3.0	46	8.0	34	224	
" "	"	"	Aug. 5	1	25.0	4.3	51.1	2.4	93	8.0	48	228	
Little Vermilion R, below Georgetown, Ill.	WLv	268	July 26	3	27.5	3.7	45.7	3.0	91	7.9	37	235	99
" "	"	"	" 31	2	26.5	4.7	57.9	5.0	29	8.1	39	237	
" "	"	"	Aug. 5	1	25.5	4.0	47.6	6.7	23	8.1	48	252	
Prairie Creek, below Lebanon, Ind.	WSuPr	313	Sept. 12	1	15.0	1.7	16.6	4.4	460	7.7	3	318	264
" "	"	"	" 16	1	14.5	2.5	24.2	4.4	23	7.5	3	298	
" "	"	"	" 23	1	19.0	2.8	29.7	7.2	150	7.6	3	300	
Sugar Creek, above Crawfordsville, Ind.	WSu	283	Oct. 1	5	14.5	8.6	84.0	2.3	4	8.1	12	320	244
" "	"	"	" 8	7	14.0	8.0	77.0	2.1	46	7.8	45	312	
" "	"	"	" 15	8	14.5	8.0	77.6	1.9	23	8.0	35	208	
Sugar Creek, below Crawfordsville, Ind.	WSu	278	Oct. 1	8	15.0	5.8	57.1	2.7	150	7.6	7	250	260
" "	"	"	" 8	10	15.0	3.9	38.5	5.4	2,400	7.6	30	213	
" "	"	"	" 15	15	15.0	2.9	29.0	7.5	11,000	7.5	45	200	
Sugar Creek, 1½ mi. above mouth	WSu	246	Sept. 25	28	15.0	8.5	83.7	2.8	15	8.0	5	205	
" "	"	"	Oct. 2	28	12.5	9.0	83.7	0.8	24	8.0	5	223	183
" "	"	"	" 7	30	17.5	7.3	75.9	1.4	93	7.7	15	194	
" "	"	"	Nov. 8	46	6.0	11.7	93.8	0.8	7	8.0	2	242	
" "	"	"	" 15	63	3.5	13.8	104.0	1.5	24	7.9	12	244	
" "	"	"	" 22	63	10.0	11.1	98.0	1.4	24	8.0	3	250	
Wabash River, above Montezuma, Indiana	W	240	Sept. 25	943	14.0	8.4	81.5	2.3	4	8.1	15	198	
" "	"	"	Oct. 2	860	17.0	10.2	104.9	4.0	4	8.1	15	213	149
" "	"	"	" 7	1,880	18.0	8.0	84.3	1.3	9	8.1	15	202	
" "	"	"	Nov 8	1,130	7.0	12.9	105.9	3.9	15	8.4	55	237	
" "	"	"	" 15	1,770	3.0	13.6	100.7	2.0	240	8.1	65	219	
" "	"	"	" 22	1,290	7.5	11.9	95.5	1.4	23	8.1	20	240	
Raccoon Creek, 1½ mi. above mouth	WRa	239	Sept. 25	28	15.0	8.3	81.6	1.7	43	7.9	10	225	
" "	"	"	Oct. 2	28	12.5	9.5	88.5	0.9	4	8.1	5	233	243
" "	"	"	" 7	28	17.5	7.1	73.7	2.1	46	7.7	10	210	
Wabash River, above Clinton, Indiana	W	240	Sept. 25	970	17.0	8.8	90.6	2.9	9	8.1	15	200	
" "	"	"	Oct. 2	891	17.0	10.3	105.3	3.8	2	8.1	15	216	237
" "	"	"	" 7	1,910	18.5	8.2	87.1	2.1	8	8.2	10	227	

TABLE W-7 WABASH RIVER BASIN

OHIO RIVER POLLUTION SURVEY
LABORATORY DATA

SUMMARY OF INDIVIDUAL RESULTS

Sampling Point	Mileage From Mouth		Date 1950	Average Discharge c.f.s.	Temp. °C	Dissolved Oxygen p.p.m.	Dissolved Oxygen % Sat.	5 Day B.O.D. p.p.m.	Coliform M.P.N. Per ml	pH	Turbidity p.p.m.	Alkalinity p.p.m.	Hardness p.p.m.
Wabash River, below Clinton, Indiana	W	229	Sept. 25	971	18.0	9.1	95.7	3.9	29	8.2	15	199	
" "	"	"	Oct. 2	892	17.0	10.3	105.9	3.8	58	8.1	10	219	235
" "	"	"	" 7	1,910	18.5	8.5	89.6	3.9	41	8.2	10	182	
N. Br. Brouillet's Creek above Chrisman, Ill.	WBrBb	254	July 26	**	25.5	2.2	26.5	6.0	36	7.7	140	242	99
N. Br. Brouillets Cr. below Chrisman, Ill.	WBrBb	253	July 26	**	26.0	2.3	28.0	3.1	36	7.7	43	196	93
Wabash River, above Terre Haute, Ind.	W	218	Sept. 26	669	15.0	8.3	81.6	3.1	23	8.1	10	206	
" "	"	"	Oct. 3	700	16.5	9.0	91.5	3.9	4	8.1	10	215	197
" "	"	"	" 8	1,530	16.5	8.0	81.0	2.1	46	8.1	10	205	
" "	"	"	" 10	1,640	15.5	7.7	76.2	2.0	46	7.8	15	170	
" "	"	"	" 16	1,530	12.0	8.0	74.1	2.9	240	7.7	230	162	
" "	"	"	Nov. 5	1,370	12.0	10.3	95.1	4.7	21	8.2	15	217	
" "	"	"	" 12	1,620	6.0	10.9	87.7	6.3	43	8.2	75	218	232
" "	"	"	Nov. 18	1,540	2.0	12.9	93.4	5.4	150	8.0	20	225	
" "	"	"	" 25	1,250	5.0	11.2	87.8	3.6	9	7.9	5	226	
Wabash River at waterworks Terre Haute, Indiana	W	215	Sept 26	669	17.0	8.7	89.3	2.3	24	8.1	15	206	
" "	"	"	Oct. 3	700	16.5	9.3	94.2	2.4	4	8.1	10	217	169
" "	"	"	" 8	1,530	17.0	8.2	84.4	1.9	21	8.0	5	210	
" "	"	"	" 10	1,640	16.5	7.5	76.5	1.9	9	7.7	25	173	
" "	"	"	" 16	1,530	14.5	7.9	77.0	2.8	240	7.7	160	167	
" "	"	"	Nov. 5	1,370	12.5	10.6	99.0	4.6	9	8.2	15	211	
" "	"	"	" 12	1,620	6.0	11.1	89.3	4.7	43	8.2	90	224	212
" "	"	"	" 18	1,540	2.5	12.9	94.7	4.6	240	8.0	20	221	
" "	"	"	" 25	1,250	5.0	11.3	88.4	2.5	4	7.9	10	231	
Sugar Creek, 100 yds. below Paris, Ill.	WSc	232	Aug. 12	1	23.5	3.8	43.6	11.4	2,400	7.2	5	188	174
" "	"	"	" 15	1	24.0	2.8	32.8	13.6	4,600	7.4	10	294	
" "	"	"	" 20	1	20.0	3.6	38.7	20.2	9,300	7.4	5	270	
Sugar Creek, below Paris, Ill.	WSc	231	Aug. 12	1	24.5	2.4	29.0	14.2	7,500	7.7	5	280	136
" "	"	"	" 15	1	25.0	2.6	30.5	12.3	430	7.9	5	306	
" "	"	"	" 20	1	19.0	1.6	17.4	6.2	2,400	7.4	10	170	
Wabash River, 2½ mi. below Terre Haute, Ind.	W	210	Sept. 26	672	16.5	1.4	14.7	10.6	96,000	7.6	10	207	
" "	"	"	Oct. 3	705	16.0	2.1	21.4	12.3	27,300	7.6	20	224	168
" "	"	"	" 8	1,540	16.5	3.0	29.9	12.9	33,970	7.7	20	210	
" "	"	"	" 10	1,650	16.0	5.2	51.8	13.6	4,030	7.6	15	171	
" "	"	"	" 16	1,540	11.5	6.4	58.7	11.0	6,200	7.8	20	188	
" "	"	"	Nov. 5	1,370	13.0	8.7	82.4	16.4	8,650	8.1	20	215	
" "	"	"	" 12	1,620	6.0	10.4	83.4	13.9	330	8.1	85	218	225
" "	"	"	" 18	1,540	2.5	12.8	93.7	11.5	930	8.0	25	227	
" "	"	"	" 25	1,250	5.0	10.4	81.6	8.7	570	7.9	15	231	
Wabash River, 7 miles below Terre Haute, Ind.	W	205	Sept. 26	673	16.5	1.1	11.3	8.2	35,000	7.7	10	210	
" "	"	"	Oct. 3	706	16.0	1.5	15.2	9.3	16,000	7.7	10	227	167

TABLE V-7 WABASH RIVER BASIN

OHIO RIVER POLLUTION SURVEY
LABORATORY DATA

SUMMARY OF INDIVIDUAL RESULTS

Sampling Point	Mileage from Mouth		Date 1960		Average Discharge c.f.s.	Temp. °C	Dissolved Oxygen		5 Day B.O.D. p.p.m.	Coliform M.P.N. Per ml	pH	Turbidity p.p.m.	Alkalinity p.p.m.	Hardness p.p.m.
							p.p.m.	% Sat.						
WABASH R. 7 Miles Below Terre Haute, Ind.	W	205	Oct.	8	1,590	17.0	0.8	8.7	8.2	30,500	7.7	10	214	
" "	"	"	"	10	1,650	16.0	3.8	37.7	9.9	5,800	7.6	15	175	
" "	"	"	"	16	1,590	11.5	5.5	50.5	8.4	9,300	7.7	10	192	
" "	"	"	Nov.	5	1,480	14.0	7.8	75.6	12.8	4,100	8.0	20	217	
" "	"	"	"	12	1,640	7.0	9.8	80.3	12.5	430	8.0	75	220	282
" "	"	"	"	18	1,680	3.0	12.4	92.0	11.0	230	8.1	25	231	
" "	"	"	"	25	1,320	5.0	9.6	74.7	7.2	230	7.8	15	235	
Wabash River 12 mi. below Terre Haute, Ind.	W	199	Sept.	26	678	19.0	2.0	21.1	5.0	4,300	7.7	10	212	
" "	"	"	Oct.	3	711	14.0	3.9	40.8	2.6	750	8.1	5	224	205
" "	"	"	"	8	1,590	18.0	1.6	16.7	5.5	360	7.6	5	211	
" "	"	"	"	10	1,660	17.0	2.1	21.8	6.3	2,300	7.5	5	189	
" "	"	"	"	16	1,590	12.0	3.2	29.7	7.8	4,300	7.6	10	194	
" "	"	"	Nov.	5	1,490	14.0	7.4	72.4	9.5	1,660	8.0	20	215	
" "	"	"	"	12	1,660	7.0	9.5	78.3	10.5	840	8.1	75	216	186
" "	"	"	Nov.	18	1,670	3.0	12.1	89.8	10.3	430	8.0	30	227	
" "	"	"	"	25	1,370	5.0	8.6	57.6	7.5	1,340	7.7	15	239	
Big Creek, below Marshall, Ill.	WB1	198	Aug.	12	**	24.0	3.8	44.1	26.4	240,000	7.7	25	251	191
" "	"	"	"	15	**	24.5	3.6	43.1	19.1	24,000	7.6	5	278	
" "	"	"	"	20	**	18.5	5.0	52.8	13.0	15,000	7.8	5	254	
Wabash River, Darwin's Ferry	W	190	Sept.	27	1,060	18.0	3.9	41.0	3.9	580	7.7	5	215	
" "	"	"	Oct.	4	1,050	18.5	3.3	34.6	4.0	41	7.6	5	226	167
" "	"	"	"	9	1,350	17.5	2.5	25.6	3.9	290	7.6	5	215	
" "	"	"	"	11	1,720	19.0	2.6	27.6	3.6	990	7.5	5	176	
" "	"	"	"	17	1,690	15.0	4.7	46.5	4.3	230	7.5	5	194	
" "	"	"	Nov.	6	1,520	11.0	5.9	53.2	9.3	2,400	8.0	15	217	
" "	"	"	"	13	1,840	6.0	9.5	75.9	14.6	230	8.1	65	221	237
" "	"	"	"	19	1,680	3.0	11.2	83.0	8.9	430	7.8	20	226	
" "	"	"	"	26	1,630	6.0	8.6	70.7	7.2	241	7.7	5	233	
" "	"	"	Aug.	12	1,110	27.0	4.8	59.4	5.8	460	7.6	5	216	164
" "	"	"	"	15	1,030	29.0	5.0	64.4	5.1	460	7.7	5	217	
" "	"	"	"	20	1,190	24.0	3.5	41.3	4.6	93	7.6	5	199	
Wabash River, Riverview Ferry	W	182	Sept.	27	1,060	17.5	6.5	67.6	3.0	240	7.7	5	215	
" "	"	"	Oct.	4	1,050	18.0	5.2	55.0	3.4	93	7.7	5	231	140
" "	"	"	"	9	1,350	17.5	3.3	34.6	3.7	43	7.6	5	220	
" "	"	"	"	11	1,720	18.0	3.3	34.6	3.3	930	7.6	5	180	
" "	"	"	"	17	1,700	15.0	4.8	47.5	3.7	430	7.5	5	196	
" "	"	"	Nov.	6	1,590	11.0	7.3	65.5	5.1	1,100	8.0	20	215	
" "	"	"	"	13	1,043	6.0	10.1	80.8	8.2	2,400	8.0	65	214	195
" "	"	"	"	26	1,705	6.0	9.1	72.9	4.4	91	7.7	5	235	
" "	"	"	"	19	1,750	4.0	11.0	83.6	6.2	230	7.8	20	226	
Wabash River, Hutsonville Ferry	W	182	Sept.	27	1,070	17.0	7.4	76.4	3.5	15	7.9	5	216	
" "	"	"	Oct.	4	1,060	18.5	6.9	72.9	3.6	43	7.7	5	229	182

TABLE V-7 WABASH RIVER BASIN

OHIO RIVER POLLUTION SURVEY
LABORATORY DATA

SUMMARY OF INDIVIDUAL RESULTS

Sampling Point	Mileage from Mouth	Date 1940	Average Discharge c.f.s.	Temp. °C	Dissolved Oxygen p.p.m.	Dissolved Oxygen % Sat.	5 Day B.O.D. p.p.m.	Coliform M.P.N. Per ml	pH	Turbidity p.p.m.	Alkalinity p.p.m.	Hardness p.p.m.
Wabash River, Hutsonville Ferry	W 182	Oct. 9	1,370	17.5	4.4	45.2	3.3	43	7.6	5	223	
" "	" "	" 11	1,750	19.0	5.1	54.8	2.7	43	7.6	5	205	
" "	" "	" 17	1,720	15.0	5.5	54.4	4.6	93	7.6	5	193	
" "	" "	Nov. 6	1,650	11.0	8.5	76.7	4.9	93	8.1	15	207	
" "	" "	" 13	1,850	6.0	10.1	80.6	6.6	240	8.0	60	212	231
" "	" "	" 26	1,770	6.0	8.3	66.3	4.6	930	7.7	5	234	
" "	" "	" 19	1,820	4.0	11.3	86.1	7.3	460	7.8	25	221	
Wabash River, Merom Ferry	W 165	Sept. 27	1,080	17.0	7.6	77.5	3.6	15	7.9	5	217	
" "	" "	Oct. 4	1,070	17.5	6.7	69.2	3.6	4	7.8	5	227	141
" "	" "	" 9	1,380	16.5	1.2	11.8	8.7	36	7.6	5	227	
" "	" "	" 11	1,760	18.5	5.7	60.2	4.1	150	7.7	5	209	
" "	" "	" 17	1,730	15.0	7.4	73.3	2.1	9	7.8	5	195	
" "	" "	Nov. 6	1,700	12.0	10.4	96.4	6.5	110	8.2	20	204	
"	" "	" 13	1,850	6.0	11.1	88.8	7.1	240	8.0	50	213	208
" "	" "	Nov. 19	1,890	4.0	11.6	88.2	7.9	1,100	7.8	20	219	
" "	" "	" 26	1,830	6.0	9.2	73.7	4.2	150	7.7	5	235	
LaMotte Creek, below Palestine, Illinois	Wla 159	Sept. 3	**	21.5	3.1	34.8	13.6	150	7.6	480	132	79
" "	" "	" 13	**	19.0	12.7	135.6	6.2	93	8.7	140	160	
Sugar Creek, 1/2 mile below Robinson	WlaSu 169	Sept. 3	4	20.0	0.0	00.0	56.7	46,000	7.2	38	215	157
" "	" "	" 9	4	21.0	1.6	17.8	35.2	4,300	7.2	25	110	
" "	" "	" 13	4	16.0	0.0	00.0	19.2	24,000	7.3	20	205	
Busseron Creek 4 miles below Sullivan, Ind.	WBu 163	Sept. 27	2	12.5	4.5	42.4	4.4	230	7.3	5	95	
" "	" "	Oct. 1	2	15.0	5.3	52.0	5.4	23	7.6	10	135	187
" "	" "	" 15	2	16.0	0.0	00.0	34.8	240,000	7.5	20	300	
Russelville Ferry Wabash River	W 140	Sept 4	1,640	23.0	8.0	92.4	5.6	21	8.1	20	200	156
" "	" "	" 10	1,610	23.5	6.8	79.7	6.0	31	8.1	15	202	
" "	" "	Sept. 16	1,590	20.0	8.8	95.5	4.6	93	8.1	20	197	
" "	" "	" 18	1,560	21.0	9.1	100.9	5.0	43	8.2	20	189	
" "	" "	Nov. 6	1,870	12.0	9.9	91.4	3.2	46	8.0	10	187	
" "	" "	" 13	1,870	6.0	13.1	105.2	7.5	240	8.2	60	221	228
" "	" "	" 19	2,140	4.0	11.6	88.5	6.3	43	7.7	20	206	
" "	" "	" 26	2,020	6.0	10.3	82.9	4.2	14	7.8	5	238	
Wabash River, above Vincennes, Ill.	W 132	Sept. 4	1,640	24.0	8.5	99.6	4.1	9	8.1	10	201	172
" "	" "	" 10	1,610	23.0	7.2	82.9	4.2	2	8.1	15	195	
" "	" "	" 16	1,590	20.0	8.7	95.1	4.8	4	8.1	20	198	
" "	" "	" 18	1,560	21.0	9.0	100.2	4.9	2	8.2	20	190	
" "	" "	Nov. 7	1,960	11.0	10.9	98.0	4.1	28	8.1	10	190	
" "	" "	" 14	2,280	5.0	13.3	104.1	7.8	68	8.2	60	213	222
" "	" "	" 20	2,280	6.0	11.4	91.3	6.2	41	7.8	35	208	
" "	" "	" 27	2,120	6.0	10.6	85.0	4.2	9	7.8	10	237	

TABLE W-7 WABASH RIVER BASIN

OHIO RIVER POLLUTION SURVEY
LABORATORY DATA

SUMMARY OF INDIVIDUAL RESULTS

Sampling Point	Mileage from Mouth	Date 1940	Average Discharge c.f.s.	Temp. °C	Dissolved Oxygen p.p.m.	Dissolved Oxygen % Sat.	5 Day B.O.D. p.p.m.	Coliform M.P.N. Per ml	pH	Turbidity p.p.m.	Alkalinity p.p.m.	Hardness p.p.m.
Wabash River, below Vincennes, Ill.	W 126	Sept. 4	1,640	23.5	7.4	85.7	5.2	3,760	8.0	15	207	180
" "	" "	" 10	1,610	24.0	6.4	74.7	6.8	776	8.2	15	191	
" "	" "	" 16	1,990	20.0	8.1	88.8	6.9	782	8.1	15	205	
" "	" "	" 18	1,560	21.0	6.3	70.5	8.8	3,300	8.2	15	201	
" "	" "	Nov. 7	1,960	11.0	9.3	83.8	7.5	817	8.1	10	190	
" "	" "	" 14	2,280	5.0	13.8	108.0	9.4	543	8.3	60	221	
" "	" "	" 20	2,280	6.0	11.0	87.7	13.2	304	7.8	40	211	
" "	" "	" 27	2,120	6.0	9.3	74.6	8.9	290	7.7	15	248	
West Branch Scattering Fk. below Tuscola, Ill.	WEmSfWb 197	Aug. 9	**	22.0	0.0	00.0	32.0	46,000	7.7	15	483	
" "	" "	" 14	**	24.0	2.0	23.2	14.9	15,000	7.7	10	483	
" "	" "	" 19	**	17.0	1.6	15.9	15.0	21,000	7.6	10	310	
Riley Creek, below Mattoon, Ill.	WEmR 246	Aug. 9	1	24.0	10.9	128.0	13.8	240,000	8.2	15	333	136
" "	" "	" 14	1	26.0	9.8	116.7	19.2	43,000	8.1	10	350	
" "	" "	" 19	1	18.5	5.0	52.4	10.8	93,000	7.8	10	267	
Town Branch, below Charleston, Ill.	WEmRCcTb 239	Aug. 8	2	26.0	6.0	73.4	4.6	930	7.8	5	199	149
" "	" "	" 13	2	25.5	3.6	43.4	10.9	2,400	7.6	5	247	
" "	" "	" 16	2	26.0	5.0	61.3	2.8	2,300	7.6	5	215	
Cassell's Creek, below Charleston, Ill.	WEmRCc 237	Aug. 8	2	29.5	15.8	204.8	3.0	21	9.1	5	219	142
" "	" "	" 13	2	28.0	14.7	186.1	2.5	93	8.8	5	268	
" "	" "	" 16	2	28.5	14.8	188.3	2.6	75	8.8	5	251	
Kickapoo Creek, below Mattoon, Ill.	WEmK 244	Aug. 9	1	24.5	0.0	00.0	34.0	24,000	7.8	15	339	138
" "	" "	" 14	1	25.0	0.0	00.0	27.1	43,000	7.6	15	361	
" "	" "	" 19	1	19.0	1.3	13.9	13.9	23,000	7.7	10	206	
Embarras River, above Greenup, Ill.	WEm 212	Aug. 8	12	27.5	8.2	102.6	4.2	46	8.2	15	252	140
" "	" "	" 13	12	27.0	7.2	89.0	3.2	24	8.1	10	263	
" "	" "	" 16	12	27.0	6.7	82.5	5.8	4	8.1	20	257	
Embarras River, below Greenup, Illinois	WEm 210	Aug. 8	12	27.0	7.9	97.6	4.1	93	8.1	15	258	136
" "	" "	" 13	12	27.5	6.8	85.6	3.4	9	8.1	15	267	
" "	" "	" 16	12	27.0	6.5	80.0	2.4	23	8.0	20	264	
Embarras River, above Newton, Illinois	WEm 189	Sept. 3	31	20.0	8.0	87.0	3.2	460	8.1	70	168	143
" "	" "	" 9	33	21.5	6.5	72.5	3.4	23	7.8	25	135	
" "	" "	" 13	30	14.5	8.0	78.4	2.7	46	7.7	25	160	
Embarras River, below Newton, Ill.	WEm 187	Sept. 3	31	20.0	7.7	83.5	4.3	240	8.1	95	162	
" "	" "	" 9	33	20.0	6.4	69.4	5.9	43	7.7	85	189	
" "	" "	" 13	30	16.0	7.8	78.0	3.0	15	8.0	20	204	
S. Fk. Embarras River below Martinsville, Ill.	WEmSf 205	Aug. 12	**	30.0	9.2	121.2	6.4	23	8.1	10	206	141
" "	" "	" 15	**	30.0	9.6	125.6	6.7	4	8.2	10	218	
" "	" "	" 20	3	20.0	5.4	58.5	4.1	240	7.5	110	106	

TABLE W-7 WABASH RIVER BASIN

OHIO RIVER POLLUTION SURVEY
LABORATORY DATA

SUMMARY OF INDIVIDUAL RESULTS

Sampling Point	Mileage From Mouth	Date 1940	Average Discharge c.f.s.	Temp. °C	Dissolved Oxygen p.p.m.	Dissolved Oxygen % Sat.	5 Day B.O.D. p.p.m.	Coliform M.P.N. Per ml.	pH	Turbidity p.p.m.	Alkalinity p.p.m.	Hardness p.p.m.
Town Branch, below Casey, Illinois	WEmEfTb 208	Aug. 12	**	24.0	1.6	18.5	25.0	46,000	7.6	10	225	96
" "	" "	" 15	**	25.0	1.0	12.3	10.8	24,000	7.6	5	208	
" "	" "	" 20	**	20.0	2.6	28.6	13.0	460,000	7.5	10	138	
Dogwood Creek, below Oblong, Ill.	WEmD 160	Sept. 9	**	21.0	2.5	28.3	18.6	11,000	7.7	25	359	
" "	" "	" 13	**	13.0	5.7	53.6	30.1	36	7.3	20	85	
Embarras River, above Lawrenceville, Ill.	WEm 134	Sept. 3	64	24.0	13.4	156.6	6.1	23	8.8	68	110	116
" "	" "	" 9	60	25.0	8.6	103.1	4.4	9	8.0	66	173	
" "	" "	" 13	60	21.0	10.2	113.0	3.1	4	8.2	25	190	
Embarras River, below Lawrenceville	WEm 130	Sept 3	64	25.0	7.7	91.6	30.4	150	8.0	130	106	129
" "	" "	" 9	60	29.0	2.3	29.9	19.3	230	7.7	34	164	
" "	" "	" 13	20	20.0	4.2	45.8	11.0	430	7.7	15	186	
Indian Creek, below Bridgeport, Ill.	WEmIc 132	Sept. 4	1	26.5	9.9	121.9	11.6	460	8.6	5	629	308
" "	" "	" 9	1	25.0	9.6	114.6	7.8	230	8.5	5	578	
" "	" "	" 13	1	19.5	9.6	103.2	3.5	150	8.6	5	647	
Embarras River, 1½ miles above mouth	WEm 124	Sept. 4	70	26.0	8.3	101.0	7.1	460	8.0	20	120	133
" "	" "	" 9	68	25.0	4.4	52.0	4.2	93	7.8	5	170	
" "	" "	" 13	68	20.0	5.8	62.8	4.6	23	7.9	5	181	
" "	" "	Nov. 7	35	11.0	1.7	15.3	3.8	73	7.7	5	215	
" "	" "	" 14	374	5.0	8.6	67.3	7.1	930	7.7	550	111	
" "	" "	" 27		6.0	8.1	65.1	5.6	200	7.5	30	183	
" "	" "	" 20	105	7.0	10.6	87.4	12.4	430	7.6	230	120	136
St. Francisville Ferry Wabash River	W 115	Sept. 4	1,710	26.0	9.6	116.8	7.8	93	8.1	15	188	176
" "	" "	" 10	1,680	25.0	8.2	97.3	5.1	191	8.2	10	184	
" "	" "	" 16	1,660	21.0	9.3	103.1	6.1	181	8.1	20	201	
" "	" "	" 18	1,630	21.5	8.7	97.4	6.3	460	8.2	20	192	
" "	" "	Nov. 7	1,940	11.5	8.4	76.6	4.0	210	7.8	5	185	
" "	" "	" 14	2,500	4.5	11.9	91.5	9.6	210	8.2	65	206	
" "	" "	" 27	2,120	6.0	10.1	80.9	7.6	218	7.8	20	236	236
" "	" "	" 20	2,350	6.0	11.3	90.7	11.5	112	7.8	55	200	
Wabash River, above Mt. Carmel, Ill.	W 97	Sept 5	2,770	25.0	8.9	105.7	5.9	25	8.2	15	185	185
" "	" "	" 11	2,570	21.5	8.3	92.7	3.5	5	8.1	15	179	
" "	" "	" 17	2,700	21.0	7.5	83.9	5.3	22	8.1	10	205	
" "	" "	" 19	2,700	23.5	8.4	97.1	4.8	24	8.2	15	198	
" "	" "	Nov. 8	1,830	11.0	10.5	95.0	4.8	39	8.1	10	183	
" "	" "	" 15	2,960	3.0	12.8	95.3	8.8	191	8.2	25	192	220
" "	" "	" 22	1,970	8.5	11.4	96.9	7.4	18	8.1	45	201	
" "	" "	" 28	2,040	3.5	12.4	93.0	6.5	22	8.0	25	233	
W. Fk. White River, above Winchester, Ind.	WWhWf 439	Aug. 15	2	26.5	4.4	53.4	10.3	4	7.8	65	214	236

TABLE W-7 WABASH RIVER BASIN

OHIO RIVER POLLUTION SURVEY
LABORATORY DATA

SUMMARY OF INDIVIDUAL RESULTS

Sampling Point	Mileage From Mouth	Date 1940	Average Discharge c.f.s.	Temp. °C	Dissolved Oxygen p.p.m.	Dissolved Oxygen % Sat.	5 Day B.O.D. p.p.m.	Coliform M.P.N. Per ml	pH	Turbidity p.p.m.	Alkalinity p.p.m.	Hardness p.p.m.
W. Fork White River above Winchester, Ind.	WWhWF 439	Aug. 22	1	19.0	4.3	45.6	2.3	9	7.8	90	206	
" "	" "	" 29	1	22.5	3.6	40.6	2.7	15	7.8	95	212	
West Fork White River below Winchester, Ind.	WWhWF 437	Aug. 15	2	26.0	1.9	23.5	6.1	4,600	7.8	20	310	344
" "	" "	" 22	2	19.0	2.9	30.7	8.2	46,000	8.0	17	309	
" "	" "	" 29	2	22.5	0.7	8.5	6.1	24,000	7.6	35	246	
West Fork White River, above Muncie, Indiana	WWhWF 412	Aug. 21	10	21.0	9.0	100.6	2.2	46	8.2	65	239	284
" "	" "	" 28	7	25.0	7.2	86.2	2.8	43	8.1	40	255	
" "	" "	Sept 5	7	22.0	9.7	110.1	2.6	75	8.4	45	251	
W. Fk. White River, below Muncie, Ind.	WWhWF 408	Aug. 21	14	19.5	0.0	00.0	59.6	1,100,000	6.1	70	112	376
" "	" "	" 28	7	24.0	0.0	00.0	14.0	3,600	7.3	35	225	
" "	" "	Sept. 5	7	21.0	0.0	00.0	57.6	240,000	7.4	95	271	
West Fork White River ¾ mi. below Muncie	WWhWF 405	Aug. 21	14	17.5	0.0	00.0	22.8	460,000	7.1	65	236	368
" "	" "	" 28	7	23.0	0.0	00.0	65.4	1100,000	7.1	100	264	
" "	" "	Sept. 5	7	19.5	0.0	00.0	35.4	460,000	7.3	130	312	
W. Fk. White River, above Anderson, Ind.	WWhWF 391	Aug. 21	62	24.5	9.1	107.9	6.8	460	8.2	45	264	320
" "	" "	" 28	66	23.5	6.5	75.7	3.7	43	8.1	25	251	
" "	" "	Sept. 5	54	26.5	6.8	83.5	2.6	93	8.0	35	266	
W. Fk. White River, below Anderson, Ind.	WWhWF 387	Aug. 21	62	21.5	5.3	59.5	4.0	390	8.0	55	280	284
" "	" "	" 28	66	25.0	2.3	27.3	4.1	4,600	7.8	35	279	
" "	" "	Sept .5	54	22.5	4.4	50.0	8.2	2,400	7.8	30	292	
Pipe Creek, above Alexandria, Ind.	WWhWFPi 397	Aug. 20	4	19.5	7.5	80.8	2.7	15	7.9	55	284	292
" "	" "	" 27	20	24.0	5.3	62.3	3.2	24	7.7	35	300	
" "	" "	Sept 4	1	19.5	7.9	85.3	1.7	24	7.7	25	312	
Mud Creek, below Summitville, Ind.	WWhWFPiMu 400	Aug. 20	2	16.5	2.2	23.3	34.4	11,000	7.7	30	401	376
" "	" "	" 27	2	22.5	0.7	8.0	12.3	930	7.5	18	284	
" "	" "	Sept. 4	1	18.0	1.3	13.5	33.5	4,600	7.7	30	455	
Pipe Creek, below Alexandria, Indiana	WWhWFPi 388	Aug. 20	4	20.0	2.7	29.7	7.2	4,600	7.6	15	255	268
" "	" "	" 27	4	24.0	1.7	19.8	6.3	30	7.7	12	292	
" "	" "	Sept. 4	2	19.5	2.0	21.5	7.2	430	7.7	7	336	
Pipe Creek, ¾ miles below Alexandria, Ind.	WWhWFPi 388	Aug. 20	5	19.0	3.4	36.6	3.2	93	7.8	50	238	244
" "	" "	" 27	5	23.0	3.4	39.7	6.0	2,400	7.7	60	273	
" "	" "	Sept. 4	2	18.5	3.9	41.2	4.0	460	7.8	50	316	
Duck Creek 1 mi. below Elwood, Indiana	WWhWFDu 382	Aug. 20	3	17.5	2.3	23.5	5.6	24,000	7.6	15	289	264
" "	" "	" 27	5	22.0	0.0	00.0	22.0	24,000	7.3	55	167	
" "	" "	Sept. 4	2		0.0	00.0	93.3	240,000	6.3	120	416	

TABLE W-7 WABASH RIVER BASIN

OHIO RIVER POLLUTION SURVEY
LABORATORY DATA

SUMMARY OF INDIVIDUAL RESULTS

Sampling Point	Mileage From Mouth	Date 1940	Average Discharge c.f.s.	Temp. C	Dissolved Oxygen p.p.m.	Dissolved Oxygen % Sat.	5 Day B.O.D. p.p.m.	Coliform M.P.N. Per ml	pH	Turbidity p.p.m.	Alkalinity p.p.m.	Hardness p.p.m.
Duck Creek 4½ miles below Elwood, Ind.	WhWFDu 379	Aug. 20	3	18.0	4.4	46.2	8.0	1,100	7.6	190	196	192
" "	" "	" 27	10	23.5	0.0	00.0	46.8	110,000	7.7	90	380	
" "	" "	Sept. 4	4	18.0	0.0	00.0	46.5	46,000	7.7	75	415	
Duck Creek, at mouth	WhWFDu 373	Aug. 20	6	19.5	4.2	45.6	4.9	240	7.9	15	347	296
" "	" "	" 27	5	24.0	5.1	59.2	3.2	23	7.7	12	208	
" "	" "	Sept. 4	4	19.0	3.8	40.8	6.7	2,400	7.7	12	335	
West Fork White River above Noblesville, Ind.	WhWF 363	Sept. 12	50	18.5	11.6	123.0	5.7	23	8.4	23	266	296
" "	" "	" 16	50	18.5	11.5	121.5	5.8	9	8.1	15	256	
" "	" "	" 23	50	22.0	11.9	134.4	8.1	110	8.1	35	226	
Cicero Creek, below Sheridan, Ind.	WhWFCi 396	Sept. 12	**	16.0	6.5	65.5	5.3	21	8.1	12	347	248
Cicero Creek 1½ miles below Tipton, Ind.	WhWFCi 383	Sept. 12	1	18.5	13.4	141.9	7.4	2,400	8.2	7	489	340
" "	" "	Sept. 16	1	18.0	13.1	137.1	7.9	930	8.5	12	426	
" "	" "	" 23	1	20.5	14.7	162.1	15.4	24,000	8.2	30	373	
West Fork White River below Noblesville, Ind.	WhWF 360	Sept. 12	55	19.0	8.6	91.9	8.0	460	8.1	23	263	288
" "	" "	" 16	55	18.5	9.6	101.4	7.5	240	8.0	16	276	
" "	" "	" 23	55	22.0	8.7	98.9	7.4	93	7.8	35	248	
West Fork White River, above Indianapolis, Ind.	WhWF 349	Sept. 9	80	22.0	6.2	70.2	5.0	9	8.0	45	208	260
" "	" "	" 17	70	17.5	12.0	124.9	5.0	9	8.1	35	231	
" "	" "	" 20	60	19.5	10.3	111.2	6.9	24	8.0	45	217	
" "	" "	" 24	56	22.0	6.5	74.1	6.4	46	7.8	35	246	
" "	" "	" 27	78	12.5	8.4	78.6	5.4	2	8.0	30	250	
Indiana Central Canal waterwks, intake, Indpls.	WhWFC337	Sept. 13	68	18.0	4.0	41.8	3.4	4	7.6	25	218	208
" "	" "	" 17	68	19.0	6.4	68.2	2.8	4	7.7	20	221	
" "	" "	" 20	68	21.5	7.9	89.0	2.9	15	7.7	22	217	
" "	" "	Sept. 24	70	27.5	4.0	45.7	1.9	46	7.5	20	196	
" "	" "	" 27	75	16.5	3.3	33.5	1.6	4	7.5	10	212	
Fall Creek, below Middletown, Indiana	WhWFF 370	Aug. 21	2	17.5	2.5	26.1	4.6	11,000	7.6	15	310	284
" "	" "	" 28	2	21.0	1.9	20.7	4.9	11,000	7.6	3	317	
" "	" "	Sept. 5	2	18.0	1.3	13.8	6.8	11,000	7.9	8	318	
Fall Creek, above Pendleton, Indiana	WhWFF 368	Sept. 12	10	17.0	12.7	130.6	1.6	4	8.4	7	238	280
" "	" "	" 16	9	16.5	12.1	127.0	1.3	4	8.2	3	270	
" "	" "	" 23	7	21.5	12.1	135.9	1.7	4	8.2	3	253	
Fall Creek, below Pendleton, Indiana	WhWFF 367	Sept. 12	10	18.5	7.9	83.5	2.9	1,100	8.0	8	311	280
" "	" "	" 16	9	16.5	8.6	91.3	2.1	39	7.9	7	266	
" "	" "	" 23	7	21.5	8.1	90.7	1.6	23	7.8	3	250	

TABLE V-7 WABASH RIVER BASIN

OHIO RIVER POLLUTION SURVEY
LABORATORY DATA

SUMMARY OF INDIVIDUAL RESULTS

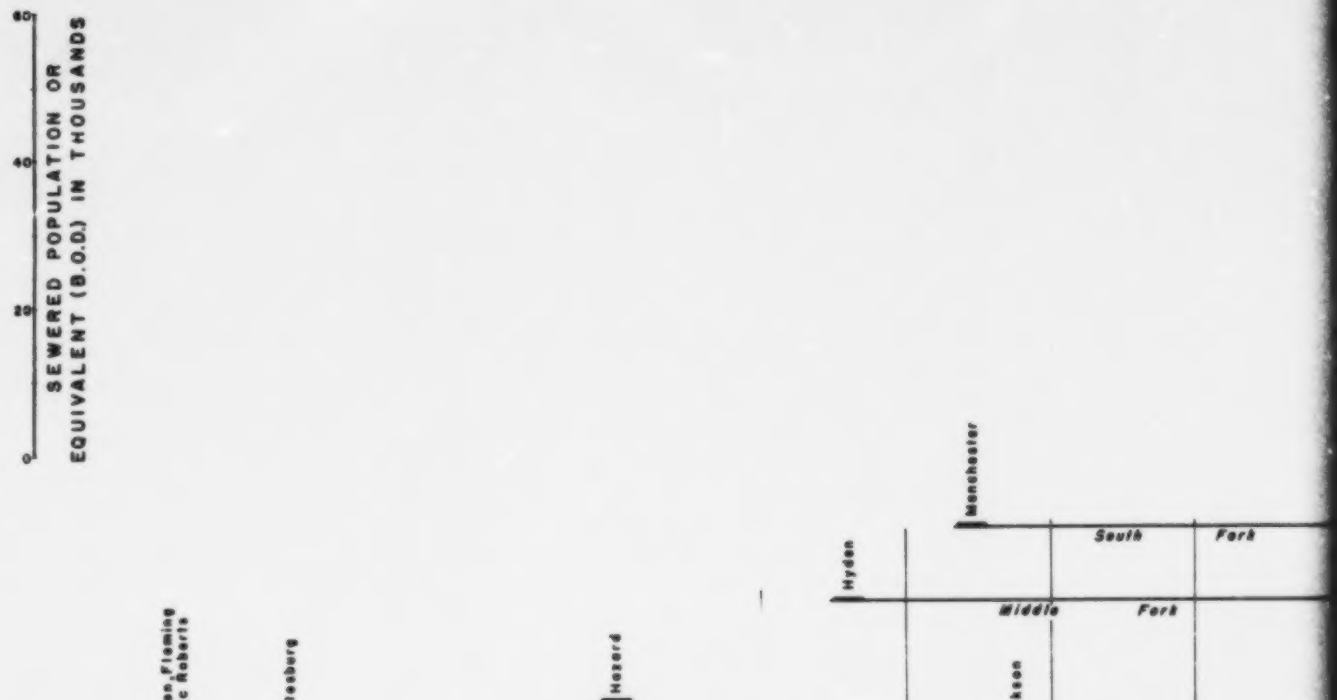
Sampling Point	Mileage From Mouth	Date 1940	Average Discharge c.f.s.	Temp. °C	Dissolved Oxygen p.p.m.	Dissolved Oxygen % Sat.	5 Day B.O.D. p.p.m.	Coliform M.P.N. Per ml	pH	Turbidity p.p.m.	Alkalinity p.p.m.	Hardness p.p.m.
Fall Creek, above Indianapolis, Ind.	WhWFF 350	Sept. 9	15	20.0	6.6	71.8	1.9	24	7.9	22	270	276
" "	" "	" 17	14	15.0	8.2	80.3	1.3	4	7.8	23	264	
" "	" "	" 20	14	17.5	6.4	66.4	0.1	23	7.8	18	260	
" "	"	" 24	14	19.5	6.8	73.2	1.0	8	7.8	17	268	
" "	" "	" 27	18	12.0	8.6	79.4	1.1	46	7.8	15	248	
Fall Creek, above Indianapolis, Ind.	WhWFF 336	Sept. 9	16	22.5	6.2	71.1	4.3	190	7.9	25	243	264
" "	" "	" 17	16	17.5	6.4	66.7	3.0	93	7.9	35	257	
" "	" "	" 20	16	20.5	8.4	92.2	3.5	2,400	8.1	18	255	
" "	" "	" 24	16	22.0	6.9	78.1	3.7	93	7.9	20	266	
" "	" "	" 27	80	14.0	8.3	80.0	4.8	240	8.1	35	236	
West Fork White River 1½ mi. below Indianapolis.	WhWF 325	Sept. 9	136	28.5	2.4	30.6	3.2	1,100	7.8	8	274	304
" "	" "	" 17	128	25.0	6.3	75.2	8.3	230	7.7	8	255	
" "	" "	" 20	123		2.8		7.7	2,400	7.6	7	294	
" "	" "	Sept. 24	121	27.0	0.4	5.1	18.9	110,000	7.6	17	326	
" "	" "	" 27	121	22.5	2.4	27.2	7.4	2,400	7.6	4	300	
W.Fk.White R. 6 mi.below Indianapolis, Ind.	WhWF 323	Sept. 9	130	26.0	2.7	33.2	5.7	240	7.8	8	302	312
" "	" "	" 17	133	24.5	6.0	71.2	8.3	23	7.7	3	265	
" "	" "	" 20	139		3.3		7.7	2,400	7.7	7	305	
" "	" "	" 24	129	26.0	0.0	00.0	28.3	24,000	7.6	20	346	
" "	" "	" 27	126	20.0	3.6	39.5	7.4	1,100	7.6	3	264	
Pleasant Run, 3½ mi. below Greenwood, Ind.	WhWFP1 325	Sept. 13	**	15.0	8.3	81.9	5.9	4	7.8	18	230	228
W. Fk. White R. 18 mi. below Indianapolis,	WhWF 312	Sept. 9	138	23.5	3.0	34.4	4.3	43	7.8	10	274	288
" "	" "	" 17	140	21.0	4.4	49.5	7.3	7	7.7	3	268	
" "	" "	" 20	146		4.2		3.6	93	7.8	5	256	
" "	" "	" 24	140	23.0	2.9	33.6	4.7	21	7.7	5	301	
" "	" "	" 27	143	17.0	5.0	51.1	8.0	93	7.8	5	311	
White Lick Creek, above Mooresville, Ind.	WhWFWl 311	Sept. 9	2	19.5	6.6	70.7	1.3	15	7.9	8	260	256
" "	" "	" 17	2	19.0	7.9	84.1	1.3	15	7.6	3	257	
" "	" "	" 24	2	21.0	5.1	96.2	1.1	93	7.7	2	270	
White Lick Creek, below Mooresville, Ind.	WhWFWl 306	Sept. 9	4	21.5	8.3	92.9	1.9	9	7.9	10	270	272
" "	" "	" 17	4	18.5	9.6	101.4	1.6	2	7.9	7	260	
" "	" "	" 24	4	21.5	7.3	82.3	1.4	4	7.7	8	268	
W. Fk. White River, above Martinsville, Ind.	WhWF 292	Sept. 10	155	21.0	10.1	111.8	4.[illegible]	2	8.2	7	256	280
" "	" "	" 18	155	21.0	10.6	117.5	3.5		8.3	7	258	
" "	" "	" 20	157		8.2		3.7	43	8.1	5	258	
" "	" "	" 25	154	17.5	10.5	109.1	3.3	46	8.1	3	260	
" "	" "	" 27	150	16.5	10.2	103.6	7.2	43	8.1	8	291	
W.Fk.White River below Martinsville, Ind.	WhWF 285	Sept. 10	156	21.5	9.9	111.1	5.8	2,400	8.1	7	265	270
" "	" "	" 18	156	21.5	10.8	121.1	5.9	2,300	8.4	8	264	
" "	" "	" 25	159	18.5	9.2	97.0	7.4	930	8.1	10	272	

TABLE V-7 WABASH RIVER BASIN

OHIO RIVER POLLUTION SURVEY
LABORATORY DATA

SUMMARY OF INDIVIDUAL RESULTS

Sampling Point	Mileage From Mouth	Date 1940	Average Discharge c.f.s.	Temp. °C	Dissolved Oxygen p.p.m.	Dissolved Oxygen % Sat.	5 Day B.O.D. p.p.m.	Coliforms M.P.N. Per ml	pH	Turbidity p.p.m.	Alkalinity p.p.m.	Hardness p.p.m.
W. Fk. White R. 4½ mi. below Martinsville, Ind.	WWhWF 285	Sept. 10	158	21.5	9.7	109.1	5.3	460	8.2	8	259	272
" "	" "	" 18	158	21.0	10.4	115.8	5.2	240	8.4	10	265	
" "	" "	" 25	160	19.0	9.4	101.1	7.8	24,000	8.1	12	264	
W. Fk. White River, above Spencer, Ind.	WWhWF 262	Sept. 23	184	23.0	9.4	108.3	5.7	15	8.1	15	218	
" "	" "	" 30	181	16.0	10.2	102.7	7.2	460	8.2	10	266	173
" "	" "	Oct. 14	178	18.0	11.5	120.3	6.1	2	8.3	15	255	
W. Fk. White River, below Spencer, Ind.	WWhWF 260	Sept 23	186	23.5	11.7	136.0	6.8	93	8.1	15	206	
" "	" "	" 30	183	16.5	12.0	122.0	6.0	230	8.2	5	254	167
" "	" "	Oct. 14	180	19.0	14.8	158.1	7.2	460	8.2	20	230	
W. Fk. White R. above mouth of Eel River	WWhWF 236	Sept. 24	186	23.0	8.0	91.9	7.5	4	7.9	15	188	
" "	" "	Oct. 1	178	16.0	11.1	111.6	2.3	4	8.1	10	217	166
" "	" "	" 15	194	15.0	8.8	87.0	7.8	4	8.1	15	198	
Eel River, above Greencastle, Ind.	WWhWFE 306	Sept. 23	1	20.0	7.0	76.3	2.2	240	7.7	10	248	
" "	" "	" 30	1	13.5	8.8	83.6	1.7	4	7.8	5	258	193
" "	" "	Oct. 14	1	17.0	7.3	74.5	1.5	15	7.7	5	252	
Eel River, below Greencastle, Ind.	WWhWFE 300	Sept. 23	2	20.0	3.2	34.9	6.3	930	7.7	5	271	
" "	" "	" 30	2	13.5	5.5	52.3	3.9	140	7.7	5	260	
" "	" "	Oct. 14	1	17.0	3.1	32.2	7.5	93	7.6	5	260	
Eel River, above Birch Creek	WWhWFE 282	Sept. 23	31	23.5	8.5	98.8	1.3	29	8.2	20	235	
" "	" "	" 30	31	17.5	9.6	99.4	0.8	24	8.1	10	222	202
" "	" "	Oct. 14	32	20.0	9.1	101.4	0.9	4	8.0	15	231	
Birch Creek, below Brazil, Ind.	WWhWFEB1 273	Sept. 23	1	22.0	3.5	40.0	6.9	4,600	7.7	20	311	
" "	" "	" 30	1	18.5	4.4	46.4	8.6	46,000	7.8	25	344	231
" "	" "	Oct. 14	1	20.5	4.2	46.5	6.4	230	7.8	10	340	
Eel River, below mouth Birch Creek	WWhWFE 257	Sept. 23	9	22.5	7.2	82.5	2.0	24	7.8	20	231	
" "	" "	" 30	10	16.0	9.0	90.9	2.1	9	7.8	10	205	199
" "	" "	Oct. 14	10	21.0	7.3	81.4	0.9	1	7.8	20	234	
Howesville Ditch, below Jasonville, Ind.	WWhWFEHa 250	Oct. 1		12.0	11.6	106.7	1.8	23	7.8	5	134	554
" "	" "	" 15	1	13.0	8.4	78.9	4.4	240	7.2	5	72	
Eel River, at mouth Worthington, Indiana	WWhWFE 236	Sept. 24	32	23.0	6.8	78.8	2.9	4	8.0	100	242	
" "	" "	Oct. 1	32	16.5	6.8	68.9	1.2	8	8.0	25	226	207
" "	" "	" 15	32	16.0	7.4	74.6	1.4	9	8.0	100	243	
W. Fork White R. 3½ mi. below Eel River	WWhWF 232	Sept. 24	307	23.0	7.1	82.0	5.7	93	7.9	46	196	
" "	" "	Oct. 1	213	15.5	9.5	94.7	5.6	9	8.1	20	218	224
" "	" "	" 15	241	14.0	8.3	79.7	6.6	21	8.1	20	204	



SEWERED POPULATION OR EQUIVALENT (B.O.D.) IN THOUSANDS
60
40
20
0
Manchester
South Fork
Hyden
Middle Fork
Neon, Fleming Mc Roberts
Whitesburg
Hazard
Jackson
North Fork
420
400
380
360
340
320
300
280
0.80 M.G.D.
0.05 M.G.D.
87
106.2
Negative Oxygen Balance i.e. B.O.D. in excess of D.O.
Dissolved Oxygen
Coliforms
Oxygen Demand
Oxygen p.p.m.
Coliforms (M.P.N.) per ml.
100000
10000
1000
500
100
50
10
1
12
11
10
9
8
7
6
5
4
3
2
1
0
October, November - 1939

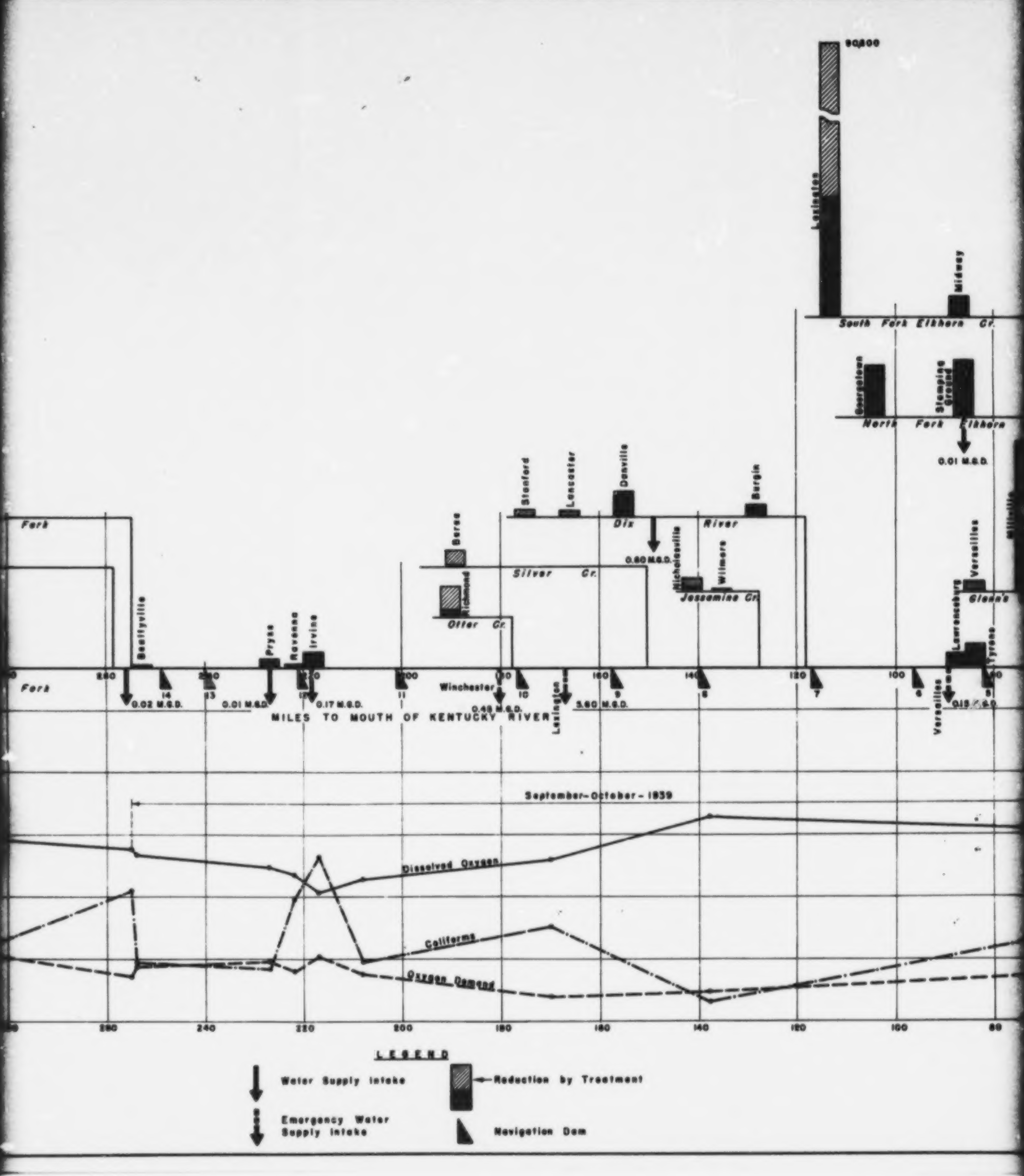

90,800
Lexington
Midway
South Fork Elkhorn Cr.
Georgetown
Stamping Ground
North Fork Elkhorn
0.01 M.G.D.
Stanford
Lancaster
Danville
Burgin
Dix River
Fork
Berea
0.60 M.G.D.
Silver Cr.
Nicholasville
Wilmore
Jessamine Cr.
Richmond
Otter Cr.
Versailles
Glenn's
Beattyville
Pryse
Ravenna
Irvine
Lawrenceburg
Tyrone
260
240
220
200
180
160
140
120
100
80
Fork
14
13
12
11
10
9
8
7
6
5
0.02 M.G.D.
0.01 M.G.D.
0.17 M.G.D.
Winchester
0.48 M.G.D.
Lexington
3.60 M.G.D.
Versailles
0.15 M.G.D.
MILES TO MOUTH OF KENTUCKY RIVER
September-October-1939
Dissolved Oxygen
Coliforms
Oxygen Demand
LEGEND
Water Supply Intake
Emergency Water Supply Intake
Reduction by Treatment
Navigation Dam

FIG. Ky-2

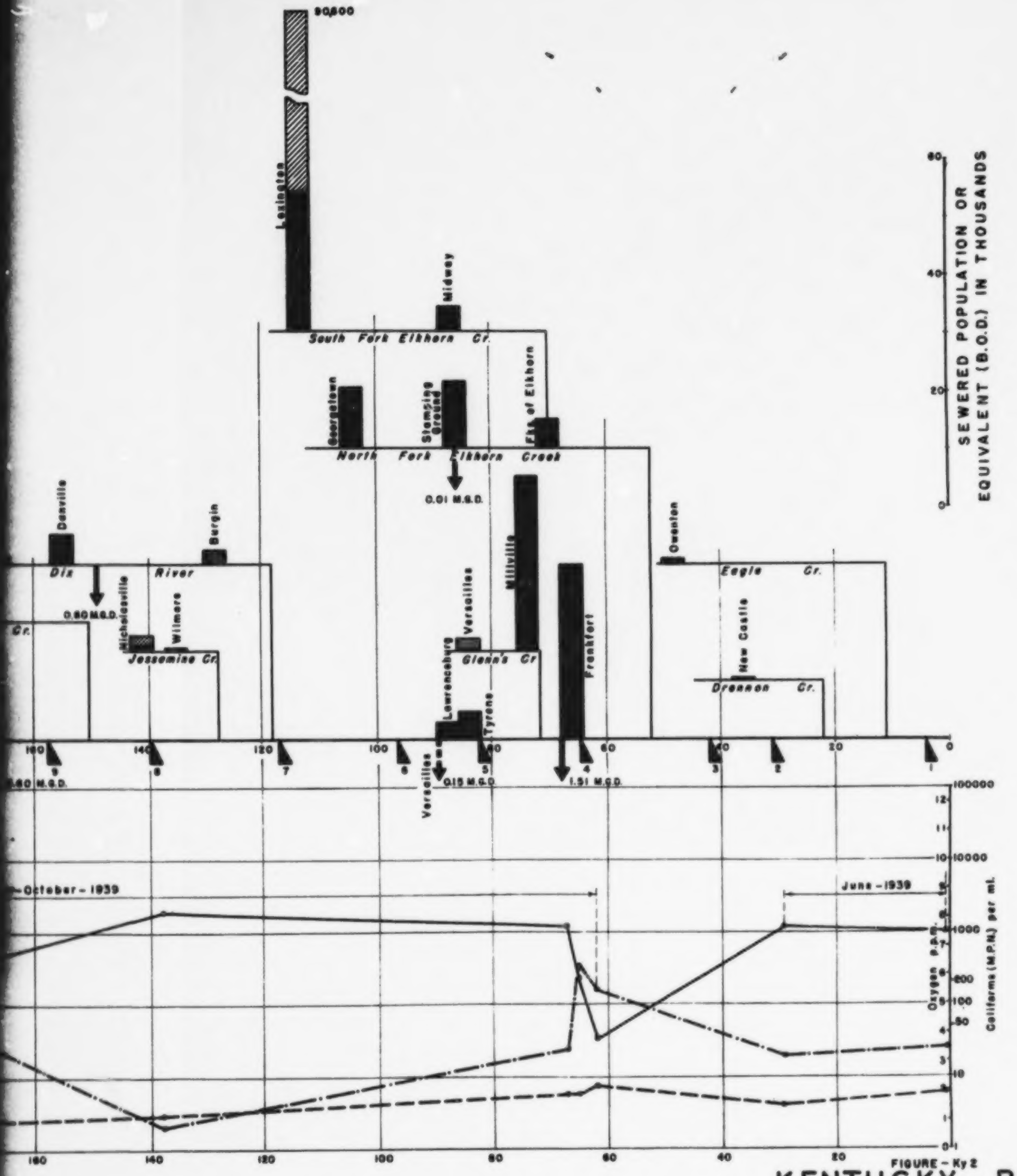


FIGURE - Ky 2

KENTUCKY RIVER

SOURCES OF POLLUTION
AND
SELECTED LABORATORY DATA

OHIO RIVER POLLUTION SURVEY
U. S. PUBLIC HEALTH SERVICE

694-A

TABLE V-7 WABASH RIVER BASIN

OHIO RIVER POLLUTION SURVEY
LABORATORY DATA

SUMMARY OF INDIVIDUAL RESULTS

Sampling Point	Mileage From Mouth	Date 1940	Average Discharge c.f.s.	Temp. °C	Dissolved Oxygen		5 Day B.O.D. p.p.m.	Coliforms M.P.N. Per ml	pH	Turbidity p.p.m.	Alkalinity p.p.m.	Hardness p.p.m.
					p.p.m.	% Sat.						
West Fork White River Bridge on Ind.Rt. 58	WhWf 232	Oct. 23	214	16.0	9.4	94.3	3.9	2	8.1	25	216	234
" "	" "	" 28	214	18.0	8.2	85.5	3.8	4	8.1	20	225	
" "	" "	" 31	252	15.0	8.7	86.1	3.8	1	8.1	20	229	
Beehunter Ditch, below Linton, Ind.	WhWfB1B4202	Sept 24	1	21.5	7.0	78.3	3.9	240	8.1	20	434	
" "	" "	Oct. 1	1	16.5	10.3	104.6	4.6	430	8.2	5	272	223
" "	" "	" 15	1	17.0	3.8	39.0	16.0	24,000	7.5	20	137	
Black Creek, above Marco, Ind.	WhWfB1 196	Sept. 24	3	22.5	6.4	72.7	1.2	7	7.7	10	196	
" "	" "	Oct. 1	3	15.5	9.2	91.5	1.1	75	8.0	5	162	394
" "	" "	" 15	3	17.0	10.8	111.1	3.4	24	8.1	5	152	
Indian Creek, below Bicknell, Indiana	WhWfI 170	Oct. 23	2	19.0	7.5	80.0	1.1	2	7.7	5	233	246
" "	" "	" 28	2	17.0	6.9	70.6	2.3	15	7.5	5	210	
" "	" "	" 31	2	11.0	8.6	77.3	1.4	9	7.4	5	174	
West Fork White River Above Prairie Creek	WhWf 162	Oct. 23	324	20.0	9.8	107.3	3.3	9	8.1	25	223	242
" "	" "	" 28	320	19.0	8.8	94.3	3.3	4	8.1	20	215	
" "	" "	" 31	324	15.0	9.5	93.4	3.3	1	8.1	20	225	
W. Fk. White River, below Washington, Ind.	WhWf 160	Oct. 23	330	18.0	9.7	101.6	4.8	240	8.1	25	220	208
" "	" "	" 28	326	19.0	8.9	95.6	9.3	430	8.1	10	217	
" "	" "	" 31	330	16.0	9.4	94.6	5.2	430	8.1	15	220	
Big Blue River, above New Castle, Indiana	WhEfDwB1 420	Aug. 21	4	16.0	10.4	104.8	1.2	24	7.8	5	331	356
" "	" "	" 26	4	19.5	8.3	89.6	1.2	46	7.7	3	335	
" "	" "	Sept 5	4	17.0	9.2	94.9	0.7	110	7.7	5	341	
Big Blue River, below New Castle, Ind.	WhEfDwB1 415	Aug. 21	8	16.0	2.0	20.5	5.6	1,100	7.3	65	290	344
" "	" "	" 26	8	21.0	0.0	00.0	2.8	23	6.8	110	194	
" "	" "	Sept. 5	14	24.0	1.7	19.7	2.8	240	7.2	45	300	
Big Blue River, above Knightstown, Indiana	WhEfDwB1406	Sept. 11	22	15.5	11.9	118.8	2.4	43	8.1	10	281	344
" "	" "	" 19	21	19.0	11.7	124.8	1.4	23	8.1	3	280	
" "	" "	" 26	24	12.5	10.0	93.4	1.9	93	7.8	5	263	
Big Blue River, below Knightstown, Indiana	WhEfDwB1403	Sept. 11	22	15.0	11.4	112.3	4.1	1,100	8.2	5	281	320
" "	" "	" 19	21	18.5	10.5	111.1	1.2	240	8.1	2	289	
" "	" "	" 26	24	11.5	7.5	68.8	7.5	1,100	7.7	3	275	
Big Blue River, above Carthage, Indiana	WhEfDwB1399	Sept. 11	24	16.0	8.9	89.1	1.6	1,100	8.0	5	271	292
" "	" "	" 19	22	17.5	7.3	75.8	1.6	390	7.9	3	244	
" "	" "	" 26	25	12.0	7.8	72.0	2.1	240	7.8	3	266	
Big Blue River, below Carthage, Ind.	WhEfDwB1-398	Sept. 11	24	16.0	6.2	62.1	4.8	93	7.9	12	289	316
" "	" "	" 19	22	19.0	4.7	50.5	5.9	240	7.8	8	295	
" "	" "	" 26	25	13.0	5.6	53.0	8.2	460	7.8	35	285	

TABLE V-7 WABASH RIVER BASIN

OHIO RIVER POLLUTION SURVEY
LABORATORY DATA

SUMMARY OF INDIVIDUAL RESULTS

Sampling Point	Mileage From Mouth	Date 1940	Average Discharge c.f.s.	Temp °C	Dissolved Oxygen p.p.m.	% Sat.	5 Day B.O.D. p.p.m.	Coliform M.P.N. Per ml	pH	Turbidity p.p.m.	Alkalinity p.p.m.	Hardness p.p.m.
Big Blue River, 6½ mi. below Carthage, Ind.	WWhEfDwBl-38	Sept 11	27	16.0	7.4	74.4	3.0	9	8.1	18	266	300
" "	" "	" 19	25	17.5	7.0	72.8	1.7	9	8.1	10	292	
" "	" "	" 26	27	12.5	7.4	69.2	2.5	9	7.9	17	273	
Big Blue River, above Shelbyville, Ind.	WWhEfDwBl-374	Sept. 10	24	19.5	6.4	69.1	3.4	24	8.1	40	267	288
" "	" "	" 18	27	17.0	7.6	78.0	1.9	240	8.1	18	266	
" "	" "	" 25	26	16.5	6.8	68.5	2.1	21	8.0	13	261	
Big Blue River, below Shelbyville, Ind.	WWhEfDwBl-372	Sept. 10	25	20.5	3.6	39.8	9.4	2,400	7.7	15	265	268
" "	" "	" 18	23	18.0	2.8	28.9	6.8	36	7.6	15	274	
" "	" "	" 25	26	16.5	2.8	27.9	10.9	2,400	7.7	15	248	
Brandywine Creek, below Greenfield, Ind.	(-391 WWhEfDwBlBw	Sept. 11	2	17.5	8.7	90.5	4.9	1,100	8.1	15	275	272
" "	" "	" 19	1	19.5	8.5	92.1	2.8	43	8.1	5	290	
" "	" "	" 26	2	14.5	7.5	72.9	4.9	1,100	7.9	3	274	
Big Blue River 5 mi. below Shelbyville, Ind.	WWhEfDwBl-367	Sept. 10	26	20.0	6.0	65.2	3.2	240	8.0	8	264	300
" "	" "	" 18	24	18.0	6.3	66.0	2.0	1,100	7.9	7	270	
" "	" "	" 25	27	16.0	3.6	36.4	2.5	43	7.7	5	249	
Big Blue R. 3 mi. above mouth, Edinburg, Ind.	WWhEfDwBl-353	Oct. 21	51	11.5	9.5	86.9	1.2	23	7.9	8	268	296
" "	" "	" 24	52	14.5	8.4	81.7	1.3	23	8.0	12	282	
" "	" "	" 29	56	15.5	7.3	72.4	1.5	23	7.8	3	270	
Sugar Creek, above Young's Creek	WWhEfDwS-357	Sept. 10	15	19.5	8.5	91.9	1.4	4	8.1	18	256	260
" "	" "	" 18	15	18.5	9.5	100.5	1.4	4	8.1	7	242	
" "	" "	" 25	16	15.5	11.3	112.3	1.2	9	8.1	5	226	
Younge Creek, below Franklin, Indiana	WWhEfDwSy-364	Sept. 10	2	18.5	0.0	00.0	149	15,000	7.7	60	536	352
" "	" "	" 18	2	16.5	0.6	5.6	25.8	46,000	8.1	25	536	
" "	" "	" 25	3	16.0	0.0	00.0	165	24,000	7.6	85	568	
Sugar Creek above Younge Creek	WWhEfDwS 356	Sept. 10	17	20.0	8.6	93.7	4.6	9	8.2	23	257	232
" "	" "	" 18	17	19.5	9.2	99.2	2.1	8	8.1	17	287	
" "	" "	" 25	19	16.0	8.2	82.7	2.2	240	8.1	13	236	
Sugar Creek, above Edinburg, Ind.	WWhEfDwS 352	Oct. 21	28	12.0	7.9	72.9	1.6	4	7.8	12	278	252
" "	" "	" 24	27	15.0	8.3	81.4	2.0	**	7.9	7	278	
" "	" "	" 29	30	16.0	5.8	58.7	1.6	4	7.8	5	280	
Driftwood River, below Edinburg, Indiana	WWhEfDw 350	Oct. 21	79	12.0	9.1	84.0	1.5	43	8.0	7	274	280
" "	" "	" 24	79	15.0	8.5	83.9	1.8	43	8.0	10	276	
" "	" "	" 29	86	15.0	7.3	71.9	1.4	23	7.8	8	273	
Driftwood River, above Columbus, Ind.	WWhEfDw339	Oct. 21	92	13.5	11.5	109.6	1.6	4	8.1	7	254	268
" "	" "	" 24	88	16.0	9.7	97.5	1.8	4	8.0	8	258	
" "	" "	" 29	97	16.5	8.3	84.6	1.8	4	7.9	8	264	

TABLE W-7 WABASH RIVER BASIN

OHIO RIVER POLLUTION SURVEY
LABORATORY DATA

SUMMARY OF INDIVIDUAL RESULTS

Sampling Point	Mileage From Mouth	Date 1940	Average Discharge c.f.s.	Temp. °C	Dissolved Oxygen		5 Day B.O.D. p.p.m.	Coliform M.P.N. Per ml	pH	Turbidity p.p.m.	Alkalinity p.p.m.	Hardness p.p.m.
					p.p.m.	% Sat.						
Flat Rock River, above Rushville, Ind.	WWhEfDwFl-40	Sept. 11	2	18.0	6.1	64.9	3.0	4	8.1	30	200	236
" "	" "	" 19	3	19.5	10.8	116.2	1.9	2	8.4	7	200	
" "	" "	" 26	3	15.0	7.2	71.4	3.5	15	7.8	55	184	
Flat Rock River, below Rushville, Ind.	WWhEfDwFl-39	Sept. 11	3	16.5	2.3	23.1	4.5	1,100	7.5	12	221	224
" "	" "	" 19	3	20.5	2.0	22.2	7.7	1,100	7.6	7	283	
" "	" "	" 26	3	16.5	1.8	18.3	5.4	1,100	7.5	10	172	
Flat Rock River, above Columbus, Ind.	WWhEfDwFl-34	Oct. 21	24	13.5	9.3	88.6	1.1	4	7.7	3	264	268
" "	" "	" 24	25	15.0	8.3	81.6	1.0	**	7.7	3	266	
" "	" "	" 29	25	15.5	7.4	73.2	1.2	**	7.7	2	264	
Driftwood River, below Columbus, Ind.	WWhEfDw-338	Oct. 21	116	14.5	9.3	90.7	6.9	2,400	7.8	13	256	276
" "	" "	" 24	115	16.5	8.4	85.3	4.6	430	7.7	12	268	
" "	" "	" 29	124	17.0	7.3	75.3	5.7	11,000	7.7	10	234	
Driftwood River, 10 mi. below Columbus, Ind.	WWhEfDw-326	Oct. 21	143	13.5	9.1	87.1	2.3	2,400	7.9	17	264	272
" "	" "	" 24	143	16.5	8.0	81.4	2.6	150	7.9	5	262	
" "	" "	" 29	150	16.5	6.8	69.2	1.7	230	7.8	5	306	
Sand Creek, below Greensburg, Ind.	WWhEfSa-370	Oct. 21	**	9.5	7.8	68.2	1.5	23	7.7	5	204	216
" "	" "	" 24	1	14.0	6.7	64.7	1.4	24	8.1	3	254	
" "	" "	" 29	1	15.0	4.4	43.2	2.0	9	7.8	2	286	
E. Fk. White River above Seymour, Ind.	WWhEf-314	Oct. 22	170	15.0	11.3	110.9	2.5	43	8.1	18	266	252
" "	" "	" 25	176	17.5	9.7	100.2	2.0	15	8.0	12	260	
" "	" "	" 30	170	16.5	8.6	87.0	1.8	43	8.0	17	258	
East Fork White R. below Seymour, Ind.	WWhEf 307	Oct. 22	175	16.5	12.4	125.9	2.5	93	8.1	5	259	252
" "	" "	" 25	178	18.5	10.3	109.4	2.4	240	8.1	3	257	
" "	" "	" 30	175	16.5	9.6	97.5	2.4	460	8.0	5	254	
East Fk. White R. 13 mi below Seymour, Ind.	WWhEf-296	Oct. 22	185	15.5	8.9	88.6	7.0	1,100	7.9	3	259	252
" "	" "	" 25	189	18.0	7.1	74.1	4.4	1,100	7.8	3	253	
" "	" "	" 30	185	15.5	7.8	77.2	2.9	11,000	7.9	3	255	
Vernon Fork, below Vernon, Indiana	WWhEfMuV-333	Oct. 23	**	12.5	6.4	59.3	1.4	4	7.5	10	168	156
" "	" "	" 28	**	15.0	5.3	52.2	2.5	1	7.5	8	167	
" "	" "	" 31	**	11.5	5.3	48.4	2.1	**	7.5	13	158	
Muscatatuck River, below Vernon Fork	WWhEfMu-297	Oct. 23	4	13.5	0.0	00.0	210	1,500	6.9	220	276	180
" "	" "	" 28	5	14.0	0.0	00.0	154	230	7.1	80	302	
" "	" "	" 31	5	11.0	0.0	00.0	195	430	7.0	80	316	
Smart Ditch, Vernon Fork	WWhEfMuVSd-295	Oct. 23	1	13.0	8.5	79.8	1.7	15	7.7	5	174	156
" "	" "	" 28	1	14.5	6.5	63.4	2.0	9	7.5	5	184	
" "	" "	" 31	1	9.5	8.3	72.4	1.7	9	7.6	3	182	

TABLE V-7 WABASH RIVER BASIN

OHIO RIVER POLLUTION SURVEY
LABORATORY DATA

SUMMARY OF INDIVIDUAL RESULTS

Sampling Point	Mileage From Mouth	Date 1940	Average Discharge c.f.s.	Temp. °C	Dissolved Oxygen		5 Day B.O.D. p.p.m.	Coliform M.P.N. Per ml	pH	Turbidity p.p.m.	Alkalinity p.p.m.	Hardness p.p.m.
					p.p.m.	% Sat.						
Muscatatuck River above mouth	WWhEfMu-282	Oct. 23	6	16.0	3.0	29.7	2.1	4	7.6	25	207	180
" "	" "	" 28	7	15.5	3.3	32.9	3.2	**	7.6	5	214	
" "	" "	" 31	6	14.5	0.2	1.9	8.1	1	7.5	15	220	
E. Fk. White River below Muscatatuck	WWhEf 272	Oct. 23	199	16.0	8.8	88.1	3.8	23	7.9	10	265	244
" "	" "	" 28	200	17.0	7.0	71.9	2.2	23	7.8	3	266	
" "	" "	" 31	200	13.5	8.9	85.2	1.6	4	7.9	3	257	
East Fork White River above Guthrie, Ind.	WWhEf 251	Oct. 22	231	13.0	9.2	86.8	1.7	4	7.9	3	259	256
" "	" "	" 25	231	18.0	8.5	88.7	1.2	4	8.0	3	250	
" "	" "	" 30	231	15.5	8.4	83.9	1.2	**	8.1	1	254	
Clear Creek, below Bloomington, Ind.	WWhEfSaCl-27	Oct. 22	3	12.0	6.7	61.8	11.1	11,000	7.6	7	183	184
" "	" "	" 25	4	15.5	3.3	32.8	16.1	2,400	7.2	45	136	
" "	" "	" 30	3	12.0	2.9	26.6	23.4	46,000	7.2	210	200	
Salt Creek at mouth above New Bedford, Ind.	WWhEfSa-244	Oct. 22	4	13.0	2.9	27.5	2.5	240	7.6	5	170	156
" "	" "	" 25	4	15.0	3.2	31.3	1.7	150	7.5	3	156	
" "	" "	" 30	5	14.0	1.8	17.1	1.4	1,500	7.3	3	160	
East Fork White River below Bedford, Ind.	WWhEf 238	Oct. 22	262	13.3	9.0	85.4	2.1	19	8.0	10	256	240
" "	" "	" 25	262	15.5	8.7	86.4	1.8	12	7.9	5	249	
" "	" "	" 30	262	15.3	7.2	71.4	1.6	6	7.9	10	250	
East Fork White River above shoals	WWhEf 207	Oct. 21	202	16.0	10.3	103.7	2.6	1	8.2	5	214	
" "	" "	" 24	284	19.0	10.2	108.9	2.3	2	8.1	5	221	210
" "	" "	" 29	329	17.0	8.7	89.5	2.0	2	8.1	10	219	
East Fork White River Hindustan Falls	WWhEf 189	Oct. 21	207	16.0	10.1	101.3	1.9	2	8	5	207	
" "	" "	" 24	295	19.0	10.2	108.7	1.8	**	8.2	5	219	197
" "	" "	" 29	347	16.0	8.4	87.6	1.9	1	8.1	10	215	
Lick Creek, below Paoli, Indiana	WWhEfLoLi-231	Oct. 21	2	12.0	4.6	42.5	5.2	23	7.6	15	250	
" "	" "	" 24	2	15.5	2.4	24.4	9.2	15	7.5	5	250	178
" "	" "	" 29	1	16.0	2.0	20.5	5.2	93	7.5	25	242	
Lost River, above West Baden, Ind.	WWhEfLo-217	Oct. 21	6	11.0	7.1	64.1	1.1	4	7.7	5	236	
" "	" "	" 24	6	15.0	6.2	61.1	1.3	15	7.7	5	236	225
" "	" "	" 29	6	15.0	4.1	40.0	2.2	4	7.5	5	239	
Lost River, below West Baden, Ind.	WWhEfLo-216	Oct. 21	7	12.0	0.0	00.0	6.4	4,300	7.4	5	244	
" "	" "	" 24	7	16.0	0.0	00.0	11.5	24,000	7.4	5	240	221
" "	" "	" 29	7	17.0	0.0	00.0	12.2	9,300	7.2	10	248	
East Fork White River at mouth	WWhEf 146	Oct. 22	300	15.0	9.7	95.8	1.5	1	8.1	10	218	
" "	" "	" 28	297	17.5	8.1	84.0	1.5	1	7.9	15	220	222
" "	" "	" 31	290	13.0	8.4	78.9	1.3	2	8.0	20	226	

TABLE W-7 WABASH RIVER BASIN

OHIO RIVER POLLUTION SURVEY
LABORATORY DATA

SUMMARY OF INDIVIDUAL RESULTS

Sampling Point	Mileage From Mouth	Date 1940	Average Discharge c.f.s.	Temp. °C	Dissolved Oxygen p.p.m.	Dissolved Oxygen % Sat.	5 Day B.O.D. p.p.m.	Coliform M.P.N. Per ml.	pH	Turbidity p.p.m.	Alkalinity p.p.m.	Hardness p.p.m.
White River, 3½ miles below E&W Fk. junction	WWh 143	Oct. 22	642	15.0	9.6	96.4	2.4	24	8.0	15	216	
" "	" "	" 28	626	18.0	7.9	82.4	2.0	2	8.1	20	218	230
" "	" "	" 31	596	14.0	8.7	83.5	2.5	4	8.0	25	221	
Prides Creek, below Petersburg, Indiana	WWhPr 143	Oct. 22	1	15.0	7.2	70.9	13.4	930	7.7	700	241	
" "	" "	" 28	2	19.0	8.8	93.7	4.3	4	7.8	25	213	230
" "	" "	" 31	1	9.0	8.6	74.2	13.0	16	7.8	10	274	
White River, at mouth	WWh 99	Sept. 5	1,020	25.0	8.0	96.1	3.8	9	8.1	25	176	183
" "	" "	" 11	850	20.0	7.7	84.2	3.1	3	8.1	25	192	
" "	" "	" 17	1,000	20.5	8.2	90.5	4.0	2	8.1	20	188	
" "	" "	Oct. 23	650	15.0	9.4	92.1	3.8	1	8.1	20	224	210
" "	" "	" 25	634	18.0	9.4	99.1	4.4	1	8.1	20	228	
" "	" "	" 30	604	17.0	8.5	87.7	3.5	1	8.0	25	228	
" "	" "	Nov. 8	720	10.0	11.1	98.0	3.9	3	8.2	10	217	
" "	" "	" 15	990	4.0	13.2	100.5	5.7	6	8.2	10	199	207
" "	" "	" 28	1,090	3.5	13.1	98.3	3.2	10	8.1	15	233	
" "	" "	" 22	905	9.0	13.4	115.9	5.8	4	8.2	30	220	
Patoka River, above Jasper, Indiana	WPk 182	Oct. 21	**	12.0	2.8	26.2	4.0	36	7.0	15	81	
" "	" "	" 24	**	16.5	4.2	42.1	4.3	**	6.9	10	83	88
" "	" "	" 29	**	16.0	1.2	11.7	5.0	**	6.8	15	84	
Patoka River, below Huntingburg, Ind.	WPk 173	Oct. 21	2	10.0	3.4	30.2	5.0	23	7.2	20	96	
" "	" "	" 24	2	15.0	5.3	52.2	4.2	23	7.1	10	109	83
" "	" "	" 29	2	16.0	3.0	30.6	5.8	4	6.9	15	117	
Patoka River, above Winslow, Indiana	WPk 144	Oct. 22	2	13.0	7.8	73.6	1.8	15	6.8	10	44	
" "	" "	" 25	1	16.0	5.7	57.1	3.0	75	6.8	5	50	64
" "	" "	" 30	1	12.0	4.3	39.5	5.9	43	6.8	5	52	
South Fork Ditch, above Oakland City	WPkSf-137	Oct. 22	1	12.5	8.2	76.4	1.9* 1.5	**	3.4	5		
" "	" "	" 25	1	20.0	6.3	68.9	2.5* 0.6	**	3.4	5		1,540
" "	" "	" 30	2	11.0	7.6	68.6	3.0* 1.3	**	3.4	5		
Patoka River, above Patoka, Indiana	WPk 112	Oct. 23	4	13.5	8.2	78.1	1.0* 0.8	**	4.7	5		436
" "	" "	" 25	4	19.0	7.8	83.4	2.0* 1.1	**	4.7	10		
" "	" "	" 30	4	12.0	7.8	71.8	1.8	2	6.8	25	180	
Patoka River, at mouth	WPk 96	Sept. 11	31	17.0	7.4	76.4	1.5	9	7.4	5	81	
" "	" "	" 17	34	19.0	7.3	78.5	1.3	43	6.5	15	25	
" "	" "	" 19	28	21.0	7.7	85.2	2.3	4	7.0	5	43	146
" "	" "	Nov. 8		9.0	9.6	82.5	0.9	4	7.6	5	179	
" "	" "	" 15		3.5	10.9	82.0	1.5 2.1*	**	4.5	5		446
" "	" "	" 28		4.0	10.9	83.0	1.2 2.8*	5	4.4	5	34	
" "	" "	" 22		9.0	10.1	87.3	1.8	9	6.5	5	41	

TABLE W-7 WABASH RIVER BASIN

OHIO RIVER POLLUTION SURVEY
LABORATORY DATA

SUMMARY OF INDIVIDUAL RESULTS

Sampling Point	Mileage From Mouth	Date 1940	Average Discharge c.f.s.	Temp. °C	Dissolved Oxygen p.p.m.	Dissolved Oxygen % Sat.	5 Day B.O.D. p.p.m.	Coliforms M.P.N. Per ml.	pH	Turbidity p.p.m.	Alkalinity p.p.m.	Hardness p.p.m.
Wabash River, below Mt. Carmel, Ill.	W 93	Sept. 5	1,720	26.0	8.1	98.3	5.8	97	8.0	20	176	193
" "	" "	" 11	1,690	21.5	7.0	78.6	5.0	316	8.1	20	185	
" "	" "	" 17	1,670	21.0	7.5	83.8	4.0	86	8.1	10	196	
" "	" "	" 19	1,640	22.5	7.8	88.8	3.9	20	8.1	20	199	
" "	" "	Nov. 8	2,540	11.0	10.5	95.1	5.9	16	8.1	10	190	
" "	" "	" 15	3,930	3.0	13.1	97.2	8.3	89	8.2	20	204	224
" "	" "	" 22	2,860	8.5	12.8	108.8	6.1	23	8.2	40	207	
" "	" "	" 28	3,110	3.5	12.7	95.6	6.8	65	8.1	20	225	
McCarty Ditch, below Princeton, Ind.	WCbyMed-96	Oct. 23	2	14.0	6.7	64.7	13.0	240	7.7	5	235	436
" "	" "	" 25	2	20.0	7.1	77.4	12.8	240	7.5	15	224	
" "	" "	" 30	2	12.0	7.1	65.2	13.0	2,400	7.5	10	240	
Wabash River, Hovey Ferry, Ind.	W 62	Sept. 5	3,000	25.0	7.6	90.8	4.5	12	8.2	15	195	181
" "	" "	" 6	2,950	25.5	7.3	87.7	4.0	5	8.1	15	175	
" "	" "	Sept. 12	2,850	20.5	7.8	85.8	3.7	5	8.1	15	192	
" "	" "	" 19	2,700	22.5	7.7	87.9	4.0	4	8.0	20	196	
Wabash River, below New Harmony, Ind.	W 51	Sept. 5	3,010	25.0	6.9	82.3	5.1	5	8.1	10	202	168
" "	" "	" 6	2,960	24.5	7.0	82.6	4.4	9	8.0	15	183	
" "	" "	" 12	2,860	20.5	8.0	87.6	3.7	5	8.1	15	194	
" "	" "	" 19	2,710	23.0	7.4	85.6	5.5	4	8.0	20	196	
" "	" "	Nov. 8	2,540	11.0	9.4	85.2	6.7	13	8.1	10	203	
" "	" "	" 15	3,930	2.0	12.8	92.3	8.0	21	8.2	25	192	213
" "	" "	" 28	3,110	3.0	12.3	91.2	6.4	25	8.2	20	211	
" "	" "	" 22	2,860	8.5	12.3	104.9	8.6	12	8.4	55	210	
Br. Little Wabash Cr. below Mattoon, Ill.	WLWBr 228	Aug. 9	1	24.0	1.7	20.2	39.0	46,000	7.9	25	301	139
" "	" "	" 14	1	26.0	2.4	28.7	20.0	93,000	7.8	10	318	
" "	" "	" 19	1	19.0	3.6	38.1	10.2	23,000	7.7	5	219	
Lake Mattoon, below Mattoon, Ill.	WLw 225	Aug. 9		26.0	8.2	100.0	2.7	2	8.8	5	113	
" "	" "	" 14		27.0	7.9	98.1	1.6	4	8.6	5	118	
" "	" "	" 19		23.5	5.8	67.4	3.0	4	8.0	5	119	
Big Creek, below Altamont, Ill.	WLwBg 194	Aug. 8	**	23.5	4.8	56.4	9.8	11,000	7.6	5	173	190
" "	" "	" 13	**	23.5	7.0	81.2	10.0	2,300	7.4	10	153	
" "	" "	" 16	**	28.0	2.9	36.7	11.4	2,400	7.4	25	135	
Salt Creek, above Effingham, Ill.	WLwSa 194	Aug. 8	**	23.5	3.7	43.0	3.3	1,100	7.7	5	260	147
" "	" "	" 13	**	24.5	2.3	27.0	2.9	93	7.8	5	269	
Salt Creek, below Effingham, Ill.	WLwSa 192	Aug. 8	1	24.5	4.9	58.0	2.3	430	7.6	5	167	132
" "	" "	" 13	1	24.0	4.3	49.9	2.9	91	7.5	5	203	
" "	" "	" 16	1	26.0	5.2	63.9	2.9	930	7.6	5	167	

TABLE W-7 WABASH RIVER BASIN

OHIO RIVER POLLUTION SURVEY
LABORATORY DATA

SUMMARY OF INDIVIDUAL RESULTS

Sampling Point	Mileage From Mouth	Date 1940	Average Discharge c.f.s.	Temp. °C	Dissolved Oxygen p.p.m.	Dissolved Oxygen % Sat.	5 Day B.O.D. p.p.m.	Coliforms M.P.N. Per ml	pH	Turbidity p.p.m.	Alkalinity p.p.m.	Hardness p.p.m.
Fox River, above Olney, Illinois	WLwFx 132	Aug. 30		24.5	7.5	88.4	5.1	23	7.1	10	68	
" "	" "	Sept 6		25.0	6.5	77.3	4.4	4	7.2	25	70	66
" "	" "	" 12		19.0	5.8	62.0	4.9	24	7.2	20	61	
Fox River, below Olney, Illinois	WLwFx 130	Aug. 30	2	24.0	1.5	17.6	11.9	46,000	7.5	10	218	
" "	" "	Sept. 6	2	25.0	6.1	73.0	5.1	360	7.6	26	196	100
" "	" "	" 12	2	17.5	3.8	39.0	6.0	430	7.6	15	202	
Seminary Creek, below Flora, Illinois	WLwElSy-120	Aug. 30	**	22.0	2.3	25.0	14.7	430	7.5	5	221	
" "	" "	Sept. 6	**	20.5	1.1	11.6	25.8	24,000	7.7	25	617	206
" "	" "	" 12	**	16.0	4.6	46.2	4.6	360	7.6	5	291	
Pond Creek, below Fairfield, Ill.	WLwPo 93	Aug. 30	1	23.5	2.2	25.1	5.5	230	7.5	5	192	
" "	" "	Sept. 6	1	22.5	7.9	90.7	9.4	230	7.7	5	199	181
" "	" "	" 12	1	17.0	4.5	46.2	7.4	2,400	7.6	5	181	
Butler Creek, below Albion, Ill.	WLwBu 81	Aug. 30	**	22.5	4.4	50.9	24.0	2,300	7.7	5	347	
" "	" "	Sept. 6	**	20.5	4.9	53.7	22.2	2,300	7.7	5	407	147
" "	" "	" 12		14.0	6.3	60.4	7.7	4,600	7.7	5	411	
L. Wabash River, above Carmi, Ill.	WLw 43	Aug. 23	42	24.0	5.7	66.6	2.2	120	7.6	5	175	113
" "	" "	" 26	40	24.5	4.8	56.8	2.0	9	7.6	10	188	
" "	" "	" 27	35	26.0	6.8	83.0	2.3	2	7.7	10	186	
Little Wabash River, below Carmi, Ill.	WLw 41	Aug. 23	42	24.5	7.5	89.2	3.9	430	8.1	5	167	107
" "	" "	" 26	40	25.0	4.9	58.2	5.3	91	7.7	5	183	
" "	" "	" 27	35	26.5	6.5	80.3	2.2	2,400	7.8	5	97	
Wabash River at mouth	W 0.5	Sept. 9	2,780	25.0	7.3	87.0	2.5	2	8.2	70	191	
" "	" "	" 11	3,060	20.5	8.6	94.9	2.6	2	8.2	50	209	
" "	" "	" 13	3,370	21.0	8.8	98.0	2.4	2	8.3	49	196	170
" "	" "	" 17	2,780	23.0	8.7	100.6	2.4	2	8.3	50	198	
" "	" "	Nov. 4	3,010	15.5	9.8	97.5	2.4	5	8.3	18	207	
" "	" "	" 6	3,010	12.5	10.3	96.3	2.9	4	8.2	20	219	150
" "	" "	1941 Feb. 25	5,890	3.5	14.1	106.0	3.7	**	8.1	20	203	
" "	" "	" 27	6,280	0.5	14.3	99.2	2.9	1	8.1	12	202	196

Note: * Seeded and neutralized

** Less than one.

CUMBERLAND RIVER BASIN

Final Report to the Ohio River Committee

Ohio River Pollution Survey

U. S. Public Health Service
Cincinnati, Ohio
1942

CUMBERLAND RIVER BASIN

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Fig. C-1

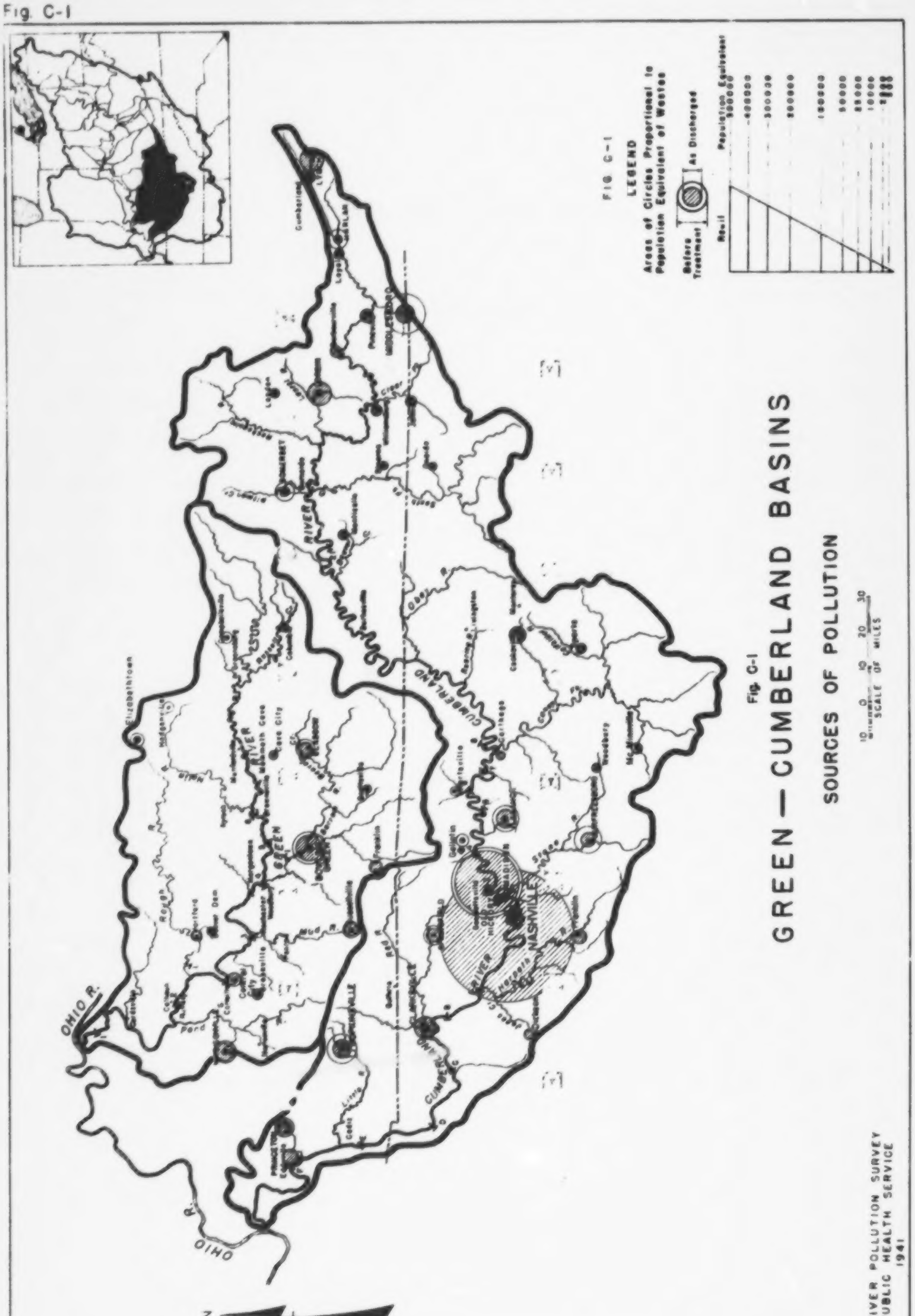


FIG. C-1
LEGEND
Areas of Circles Proportional to Population Equivalent of Wastes
Before Treatment
As Discharged
Population Equivalent
500000
400000
300000
200000
100000
50000
25000
10000
SCALE OF MILES
10 0 10 20 30
OHIO R.
CUMBERLAND RIVER
GREEN RIVER
NASHVILLE
MIDDLESBORO
Elizabethtown
N

Fig. C-1
GREEN — CUMBERLAND BASINS
SOURCES OF POLLUTION

OHIO RIVER POLLUTION SURVEY
U S PUBLIC HEALTH SERVICE
1941

CUMBERLAND RIVER BASIN

Syllabus and Conclusions

Syllabus

The Cumberland River drains about 13,000 square miles in the states of Kentucky and Tennessee. The area is predominately rural with a scattering of industries in the larger towns. One large city, Nashville, located on the main Cumberland River, contributes 55 percent of the total pollution load. An increasing number of water supplies is being taken from surface sources because of the inadequacy and undesirable characteristics of certain ground water sources. About one-third of the domestic sewage is treated, which reflects some progress toward pollution abatement. The installation of proven methods of treatment should permit more extensive use of the stream for recreation and water supply. Wolf Creek Reservoir, now under construction, will benefit the main Cumberland River and reduce the treatment requirements at Nashville.

Conclusions

(1) Nearly twice as many communities are served by ground water as by surface supplies although the actual population served by the latter exceeds the former. Ground water supplies are limited and are not of the best chemical quality. As a consequence, many have been abandoned for surface water supplies. In general, surface supplies are not seriously affected by pollution.

(2) The sewered population of the basin is about 273,000 and the sewered population equivalent of industrial wastes is 253,000. About one-third of the sewered communities have sewage treatment facilities and about one-

third of the waste producing industries have taken at least minor steps to reduce the amount of pollution discharged. Existing treatment works reduce the total pollutional load by approximately 13 percent.

(3) Laboratory studies indicate the pollution problem to be acute below Nashville, Tennessee, on the main stream, and below Princeton, Hopkinsville, Middlesboro and Corbin, Kentucky, on tributary streams. Tennessee State Health Department stream sampling results have shown low dissolved oxygen below the following additional Tennessee communities: Gallatin, Lebanon, Murfreesboro, Franklin and Dickson.

(4) The major sources of pollution, both domestic and industrial, are at Nashville on the main river. A few sections of tributary streams are grossly polluted and create problems that are primarily of local concern.

(5) With the expected increase in low water flow from the Wolf Creek Reservoir, now under construction, the sewage treatment required at Nashville will consist of sedimentation, to reduce scum and sludge deposits. The minimum tangible monetary benefit of this flow regulation, computed as equivalent to savings in treatment cost in the Nashville area, amounts to about $50,000 annually. In addition, this increase in flow is desirable for aquatic life.

(6) In view of the normal uses of the streams involved, refined treatment at certain sources of pollution would serve no purpose commensurate with the expenditure. In these instances, lesser treatment appears justified. A summary of cost estimates of remedial measures from Table C-1 follows:

Treatment	Capital Cost	Annual Charges
Existing	$1,660,000	$165,000
Suggested additional	7,140,000	565,000

Estimated additional costs, over existing charges, of programs involving uniform treatment throughout the basin are:

Primary, all places	6,750,000	515,000
Secondary, all places	10,160,000	805,000

Table C-1 Cumberland River Basin - Estimated Cost of Existing and Suggested Minimum Corrective Measures for Sewage and Industrial Wastes, with Comparative Costs for Primary and Secondary Treatment.

	Number of Plants		Population Connected to Sewers	Capital Investment (Dollars)	Annual Charges (Dollars)		
	Prim.	Sec.			Amort. & Interest	Operation & Main.	Total
Existing Sewage Treatment	7	10	64,300	1,660,000	105,000	60,000	165,000
Suggested Minimum Correction							
Sewage Treatment Plants	13	18	172,000	2,330,000	165,000	135,000	300,000
Required Interceptors			-	4,540,000	215,000	-	215,000
Independent Industrial Waste Correction				270,000	35,000	15,000	50,000
Total				7,140,000	415,000	150,000	565,000
Comparative Cost							
Primary Treatment all Waste				6,750,000	385,000	130,000	515,000
Secondary Treatment all Waste				10,160,000	625,000	180,000	805,000
As Suggested				7,140,000	415,000	150,000	565,000

Description

The Cumberland River Basin has a total drainage area of about 18,000 square miles, of which 40% lies in Kentucky and 60% in Tennessee. The Cumberland River, formed in southeastern Kentucky by the confluence of Poor and Clover Forks, flows westerly and southwesterly into Tennessee, then northwesterly across Kentucky to its confluence with the Ohio River. The topography is mountainous to hilly in the upper reaches, gradually changing to a rolling terrain in the center of the basin, which continues as such to the mouth.

Major Tributaries	Distance above Mouth	Drainage Area Square Miles
Little River	59	582
Red River	126	1,405
Harpeth River	153	895
Stone River	206	924
Caney Fork River	309	2,620
Obey River	382	920
Big South Fork River	516	1,370
Rockcastle River	541	772
Laurel River	546	282

Larger Cities	Populations			
	1910	1920	1930	1940
Nashville, Tenn.	110,364	118,342	153,866	167,402
Clarksville, Tenn.	8,548	8,110	9,242	11,831
Middlesboro, Ky.	7,305	8,041	10,350	11,777
Hopkinsville, Ky.	9,419	9,696	10,746	11,724
Murfreesboro, Tenn.	4,679	5,367	7,993	9,495
Total Basin				
Urban	156,993	183,516	245,348	277,724
Rural	701,603	730,492	758,436	851,278
Total	858,596	914,008	1,003,784	1,129,002

Resources - Natural resources of the basin consist of tillable land, forests, coal, zinc, fluorite, iron ore, phosphate rock, limestone, oil, sand and gravel. There are large potential waterpower developments.

Industries - Agriculture and its allied branches, milk and meat products, are important industries. Lumbering and wood product plants are common and in the upper reaches of the basin extensive mining operations are carried on. There is some manufacturing of cement, rayon, paper, textiles and shoes. Oil is refined at three small plants.

Water Uses - Extensive use is made of the streams for recreational purposes, including fishing, bathing and boating. The rivers and streams serve for the disposal of sewage and industrial waste. A series of low dams allows commercial navigation to move upstream about 330 miles from the mouth of the river. The use of surface water for domestic supplies is increasing. One hydroelectric reservoir on Caney Fork River has been built by private interests and is now a part of the system of the Tennessee Valley Authority. Three additional reservoirs for flood control and power are now being constructed by the U. S. Engineer Department.

Presentation of Field Data

Figure C-2 shows graphically the main stream and tributaries, water works intakes, dams, all major sources of pollution, their magnitude and reduction by present methods of treatment and other pertinent information. Laboratory data, indicating the most unfavorable pollution conditions, are shown graphically for certain sections of the main stream.

Public Water Supplies - Of 92 public water supplies, serving 368,000 persons, 16, indicated in Table C-2, are from streams below community sewer outfalls. Of the remaining supplies, 60% are disinfected and many in addition have filtration. A number of ground water sources are inadequate or unsatisfactory, containing hydrogen sulphide or undesirable minerals, or showing increases in turbidity and bacterial counts after rains. Below Nashville for 65 miles to Clarksville, no large towns use the Cumberland River as a source of supply.

Sewerage - Of 56 sewered communities in the basin, 7 have primary treatment and 10 secondary treatment. About 27 percent of the domestic sewage in the basin is treated in these 17 plants. Table C-3 shows data on the larger sources of pollution including industrial wastes.

Industrial Wastes - Table C-4 summarizes pertinent information on 86 waste producing industries in the basin. The manufacture of paper results in the greatest industrial waste pollution, followed in their order of importance by the manufacture of rayon and cellophane, meat packing, textile processing and milk products. Included in the summary table, but with no attempt at evaluation, are certain wastes of an inert or chemical nature such as sand, gravel and coal washing, fertilizer wastes, etc. Approximately half of the industrial wastes are discharged into municipal sewerage systems, the remainder reaching the watercourses through private outlets. Thirty-one plants have taken steps to reduce pollution.

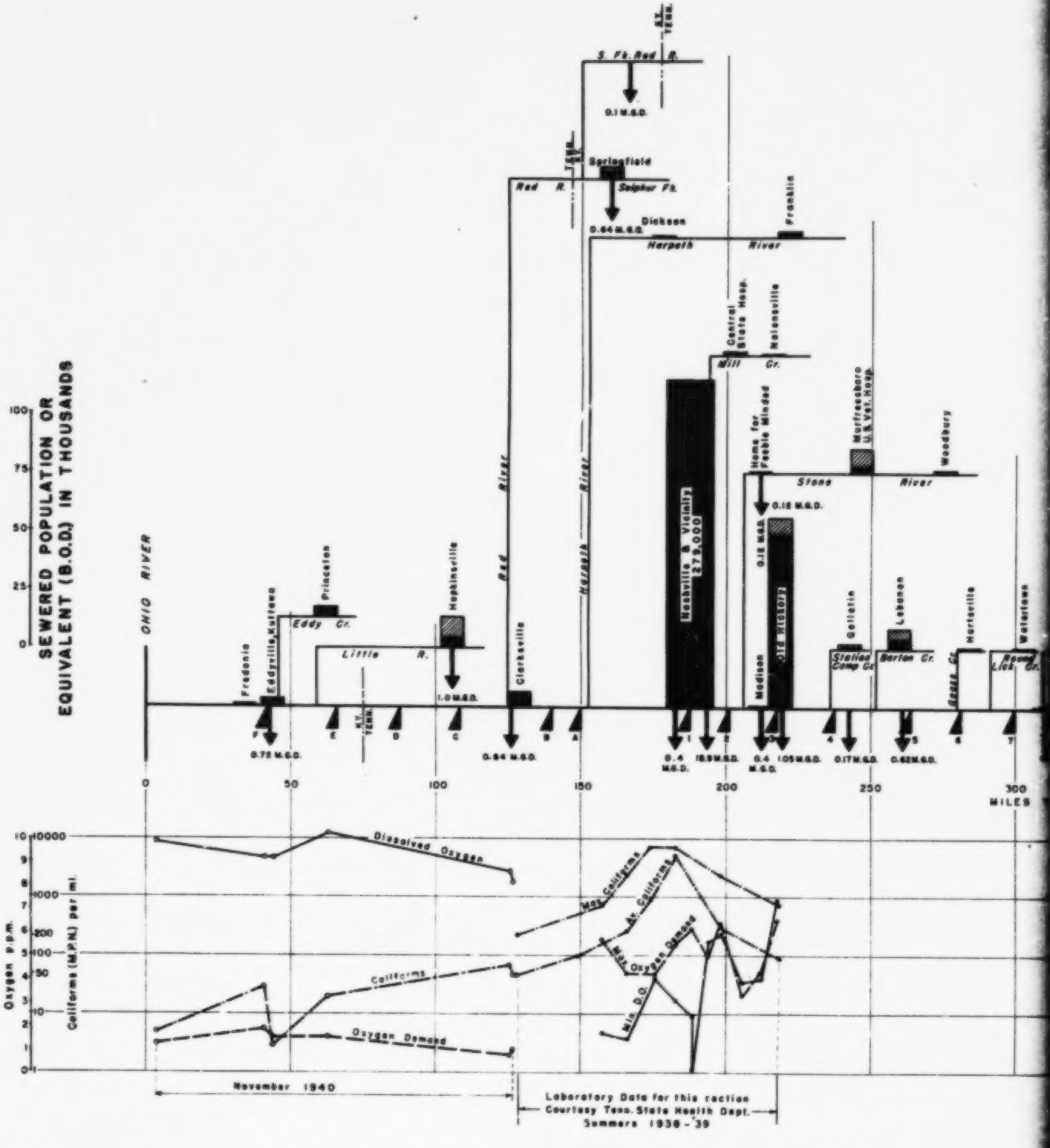
Table C-2 Cumberland River Basin - Surface Water Supplies

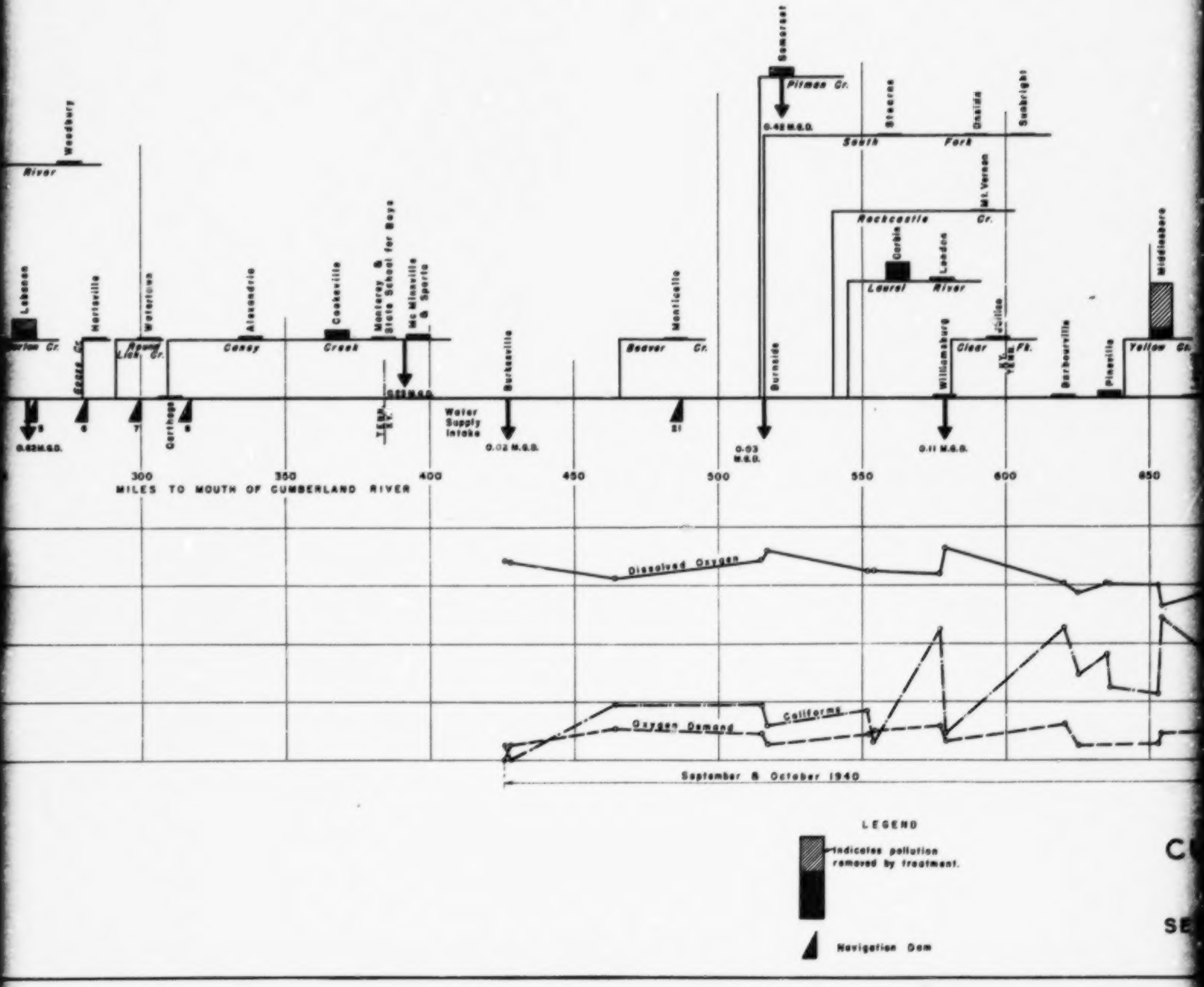
Supply	State	Source	Mile (1)	Treatment (2)	Population Served	Consumption M.G.D.
Supplies Below Community Sewer Outfalls						
St.Penitentiary	Ky.	Cumberland R.	43.6	CD	1,600	0.23
Eddyville	"	" "	43.6	FD	1,100	0.49
Clarksville	Tenn.	" "	126.9	FD	9,500	0.84
St.Penitentiary	"	" "	182.4	CD(3)	2,100	0.40
Nashville	"	" "	194.0	FD	185,000	18.90
Madison	"	" "	200.4	FD	5,400	0.40
Old Hickory	"	" "	218.3	FD	10,500	1.05
Gallatin	"	" "	239.5	FD	4,000	0.17
Lebanon	"	" "	264.0	FD	5,000	0.62
Burkesville	Ky.	" "	427.0	FD	700	0.02
Williamsburg	"	" "	579.5	FD	2,000	0.11
State Home for Feeble Minded	Tenn.	Stone River	212.	FD	700	0.12
Burnside	Ky.	S. Fork Cumberland R.	516.1	D	800	0.03
Harlan	"	Poor Fork	669.7	FD	7,500	0.26
Cumberland	"	" "	690.3	FD	2,500	0.12
Everts	"	Clover Fork	678.6	FD	1,000	0.04
Total - Below Sewer Outfalls					239,400	23.80
14 Other Surface Supplies					51,400	3.88
Total - Surface Water Supplies					290,800	27.68

(1) Miles above mouth of Cumberland River.
(2) F - Coagulated, settled, filtered, C - Coagulated, settled, D - Chlorinated.
(3) Not used for drinking.

Table C-3 Cumberland River Basin - Sources of Significant Pollution Including Industrial Waste Expressed as Sewered Population Equivalent (B.C.D.)

Municipality	Stream	Miles Above Mouth of Cumberland	Population Connected to Sewers	Treatment	Sewered Population Equivalent (B.C.D.) Untreated	Sewered Population Equivalent (B.C.D.) Discharged
State Pen., Ky.	Cumberland R.	43.7	1,600	None	1,600	1,600
Clarksville, Tenn.	" "	126.8	7,100	"	7,200	7,200
State Pen., "	" "	182.4	2,100	"	2,500	2,500
Nashville, "	" "	193.7	117,000	"	274,500	274,500
Old Hickory, "	" "	219.5	8,500	Secondary	80,500	73,300
Pineville, Ky.	" "	636.2	2,700	None	2,700	2,700
Princeton, "	Eddy Creek	63	4,200	Primary	4,500	2,900
West.St.Hosp., "	S.Fk.Little R.	106	2,100	Tank	2,100	2,100
Hopkinsville, "	N.Fk.Little R.	106.5	10,300	Secondary	11,000	2,000
Springfield, Tenn.	Sulfur Fork	160	3,300	"	5,700	2,800
Franklin, "	Harpeth River	221.5	2,700	Tank	3,000	3,000
Central St.Hosp."	Mill Creek	203	2,000	Secondary	2,200	500
Murfreesboro, "	W.Fk.Stones R.	249	6,000	"	9,200	2,100
Gallatin, "	E.Fk.Town Cr.	243	2,000	"	2,500	400
Lebanon, "	Sinking Creek	260.5	4,900	"	8,500	4,300
Cookeville, "	Short Creek	358	3,700	None	3,700	3,700
McMinnville, "	Barren Fk. Cr.	392	1,200	"	1,700	1,700
Somerset, Ky.	Sinking Creek	522.5	4,000	Secondary	4,500	1,100
Corbin, "	Lynn Camp Cr.	562.2	7,500	Tank	7,800	7,800
Middlesboro, "	Yellow Creek	653.5	9,000	Secondary	24,100	4,400
Lynch, "	Cooney Creek	694.3	8,000	None	8,000	8,000
Harlan, "	Martins Fork	670.5	5,000	Secondary	5,000	700
Small Sources(37)			22,400	Various	23,300	21,400
Total - Kentucky			65,500		82,500	43,800
Tennessee			171,800		413,300	386,900
Total - Basin			237,300		495,800	430,700


SEWERED POPULATION OR EQUIVALENT (B.O.D.) IN THOUSANDS
100
75
50
25
0
OHIO RIVER
Fredonia
Eddyville-Kuttawa
Princeton
Eddy Cr.
Little R.
Hopkinsville
1.0 M.G.D.
KY. TENN.
Clarksville
Red River
Red R.
TENN. KY.
Springfield
Sulphur Fk.
0.64 M.G.D.
S. Fk. Red R.
KY. TENN.
0.1 M.G.D.
Dickson
Franklin
Harpeth River
Nashville & Vicinity 279,000
Central State Hosp.
Mill Cr.
Helensville
Home for Feeble Minded
0.12 M.G.D.
Stone River
Murfreesboro U.S. Vet. Hosp.
Woodbury
Madison
Old Hickory
Gallatin
Station Camp Cr.
Lebanon
Barton Cr.
Goose Cr.
Hartsville
Watertown
Round Lick Cr.
F
E
D
C
B
A
1
2
3
4
5
6
7
0.72 M.G.D.
0.84 M.G.D.
0.4 M.G.D.
18.9 M.G.D.
0.4 M.G.D.
1.05 M.G.D.
0.17 M.G.D.
0.62 M.G.D.
0
50
100
150
200
250
300
MILES
Oxygen p.p.m.
Coliforms (M.P.N.) per ml.
10
9
8
7
6
5
4
3
2
1
0
10000
1000
200
100
50
10
1
Dissolved Oxygen
Coliforms
Oxygen Demand
Max. Coliforms
Av. Coliforms
Max. Oxygen Demand
Min. D.O.
November 1940
Laboratory Data for this section Courtesy Tenn. State Health Dept. Summers 1938 - '39



Woodbury
River
Lebanon
Barton Cr.
Spring Cr.
Hartsville
Round Lick Cr.
Watertown
Carthage
Alexandria
Caney
Cookeville
Creek
Monterey & State School for Boys
Mc Minnville & Sparta
TENN. KY.
Water Supply Intake
Burkesville
Beaver
Monticello
Cr.
Somerset
Pitman Cr.
0.42 M.G.D.
Burnside
0.03 M.G.D.
Stearns
Oneida
Sunbright
South
Fork
Mt. Vernon
Rockcastle
Cr.
Corbin
London
Laurel
River
Williamsburg
Jellico
Clear
Fk.
KY. TENN.
0.11 M.G.D.
Barbourville
Pineville
Middlesboro
Yellow
Cr.
5
0.62 M.G.D.
6
7
8
21
0.02 M.G.D.
300
350
400
450
500
550
600
650
MILES TO MOUTH OF CUMBERLAND RIVER
Dissolved Oxygen
Coliforms
Oxygen Demand
September & October 1940
LEGEND
▨ Indicates pollution removed by treatment.
Navigation Dam
CU
SE

FIG. C-2

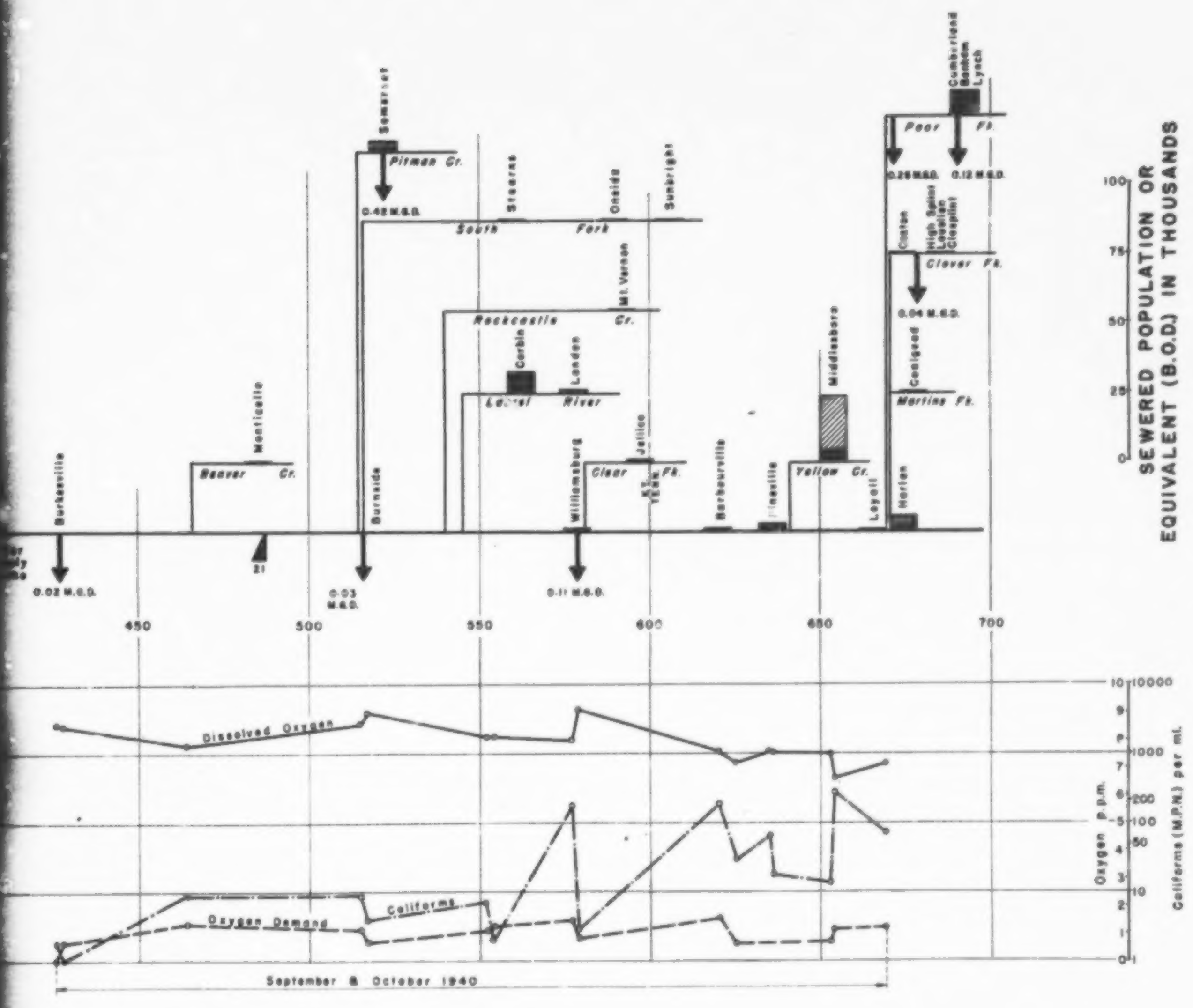


FIGURE — C2

CUMBERLAND RIVER

SOURCES OF POLLUTION
AND
SELECTED LABORATORY DATA

OHIO RIVER POLLUTION SURVEY
U. S. PUBLIC HEALTH SERVICE

112-17

Table C-4 Cumberland River Basin - Summary of Industrial Wastes not Discharging to Municipal Treatment Plants, with Total of Entire Industrial Waste Load in the Basin.

Industry	Number of Plants	Industrial Waste Disposal		At Least Minor Corrective Measures Taken	Estimated Sewered Population Equivalent (B.O.D.)
		Munic. Sewers	Private Outlet		
Canning	7	4	3	4	2,100
Chemical	2	0	2	0	72,000
Meat	5	2	3	3	37,500
Milk	25	18	7	9	9,600
Oil Refining	3	0	3	3	1,200
Textile	8	4	4	0	9,000
Miscellaneous	18	5	13	4	109,200
Wastes Unconnected Munic. Treatment	68	33	35	23	240,600
Wastes Discharged to Municipal Treatment					17,900
Total Industrial Waste in the Basin					258,500
By States - Kentucky					17,000
Tennessee					241,500

Presentation of Laboratory Data

Complete summaries of laboratory results for the Cumberland River Basin are presented in Table C-7. These data were obtained in part from operations of mobile laboratories connected with the present survey and in part from the Tennessee State Department of Health. Data for the Nashville area were collected by the Tennessee State Health Department in 1938-1939. Mobile laboratories obtained data on other parts of the basin during the fall of 1940 and spring of 1941.

Selected average monthly analytical results at some of the principal points in the basin are tabulated with stream flows on sampling days and with the minimum flows of record in Table C-5. Selected results have been chosen for low dissolved oxygen or high coli findings and, in general, represent the most unfavorable conditions during the sampling period.

Figures C-3, C-4 and C-5 show graphically, by spot map symbols, the concentration of coliform organisms, dissolved oxygen and oxygen demand, respectively, at various sampling points throughout the watershed. These data are presented as averages of all the results where the sampling period was less than a month. At points sampled by the Tennessee State Department of Health, where sampling extended over longer periods, data are presented as the most unfavorable averages during periods of minimum stream flow.

Stream flows during the period of mobile laboratory observations were generally in the lower discharge ranges, except in eastern Kentucky where local rains influenced the discharges and analytical results during the latter part of August, 1940. Data furnished by the Tennessee State Health Department were collected over a twelve month period and a wide variety of flows was encountered.

As indicated by bacteriological findings, about 76% of the sampling stations not immediately below sources of pollution showed maximum coliform organism concentrations of less than 200 per ml. In general, conditions were worse on the tributary streams than on the main river.

Dissolved oxygen results show the main river to be in good sanitary condition except below Old Hickory and Nashville. The average dissolved oxygen below Nashville reached a minimum of 2.1 p.p.m. and did not recover to a value of 5.0 p.p.m. or better within a 30-mile zone. The dissolved oxygen along the remaining portions of the main river and on many of the tributaries was in excess of 6.5 p.p.m. The worst conditions along the tributary streams occurred below London, Kentucky and Oneida, Tennessee where total oxygen depletion was observed. Dissolved oxygen values of less than 3.0 p.p.m. were also observed below Corbin, Middlesboro, Mt. Vernon, Hopkinsville and Princeton, Kentucky.

Stream sampling reported by the Tennessee State Department of Public Health, but not detailed in the present report, have shown dissolved oxygen results of 2.0 p.p.m. or less below the following Tennessee towns: Gallatin, Lebanon, Murfreesboro, Franklin and Dickson. The oxygen demand results were generally in agreement with the dissolved oxygen findings in revealing points of pollution. High average demands of between 75 and 205 p.p.m. were recorded at Jellico and Oneida, Tennessee, and at London, Corbin, Mt. Vernon and Princeton, Kentucky. Average demands of 10 to 20 p.p.m. were observed at Lynch, Kentucky and Dickson and Gallatin, Tennessee, and averages of 5 to 10 p.p.m. were found at Middlesboro, Guthrie and Hopkinsville, Kentucky and at Cookeville, Springfield, Woodbury and Lebanon, Tennessee.

Coal washing operations produced a bad appearance in the waters of Fugitt Creek, Clover Fork, Clear Fork and Hickory Creek. No acid stream conditions were observed on any of the streams in the coal mining areas of eastern Kentucky at the time of this survey.

Evidence of active self-purification in the streams was shown by reduction in coliform counts and in oxygen demand values along some of the tributaries and along the main stream below Nashville. The water quality on Poor Fork above Harlan was good despite considerable pollution from mining camps upstream. Results at the mouths of streams as compared with the results below sources of pollution further upstream in general indicated betterment in water quality. The results at Nashville tended to show that the coliform counts do not diminish rapidly under high discharge conditions and lower temperatures and persist for longer distances downstream below sources of pollution.

Biological Summary - The Cumberland has a low plankton volume of less than 2,000 p.p.m. except below Nashville, where the fertilizing effect of its sewage increases the plankton volume to 8,000 p.p.m. This stream shows very nicely the effect of domestic pollution on plankton. Fish collecting was difficult and generally small catches were obtained.

Table C-5 Cumberland River Basin - Selected Laboratory Data

Location	Mouth	At Canton,Ky.	Above Clarksville	Below Richland Creek	Above Richland Creek	Below Nashville	Above Nashville
River Miles Above:							
Mouth of Cumberland	2.8	63	127.	158.1	182.7	188.5	193.6
Period - 1940	Sept.	Nov.	Nov.	1938-39	1938-39	1938-39	1938-39
Number of Samples	4	3	3	25	18	14	17
Flow in c.f.s.:							
Sampling Days	1,530	3,997	3,020	515 (a)	648 (a)	575 (a)	643 (a)
Minimum Month	-	-	1,100	-	-	-	766
Water Temperature °C.	21.8	2.8	5.8	19.5(b)	26 (b)	23.9(b)	25.5 (b)
Coliforms per ml.	1	19	50	127 (c)	974 (c)	-	-
Dissolved oxygen ppm.	7.8	10.2	8.1	1.7(d)	3.1(d)	0.1(d)	5.6 (d)
B.O.D., 5-day, p.p.m.	1.5	1.2	2.5	5.5(e)	5.4(e)	6.2(e)	5.0 (e)

Location	Above Stones River	Above duPont Plants	Rowena Ferry	Above Burnside	Above Cumberland Falls	Above Williamsburg	Below Pineville
River Miles Above:							
Mouth of Cumberland	206	217.9	464	517	554	579	636
Period - 1940	1938-39	1938-39	Sept.	Sept.	Sept.	Sept.	Sept.
Number of Samples	14	13	3	3	3	3	3
Flow in c.f.s.:							
Sampling Days	480 (a)	515 (a)	397	227	107	88	170
Minimum Month	-	903	-	84	23	-	12
Water Temperature °C.	18.5(b)	25 (b)	14.8	13.7	16.5	21.8	24.2
Coliforms per ml.	-	87.5(c)	9	2	2	3	64
Dissolved oxygen ppm.	3.8(d)	7.3(d)	7.8	8.8	8.1	9.1	7.7
B.O.D., 5-day, p.p.m.	3.3(e)	6.5(e)	1.4	1.1	1.2	0.8	0.6

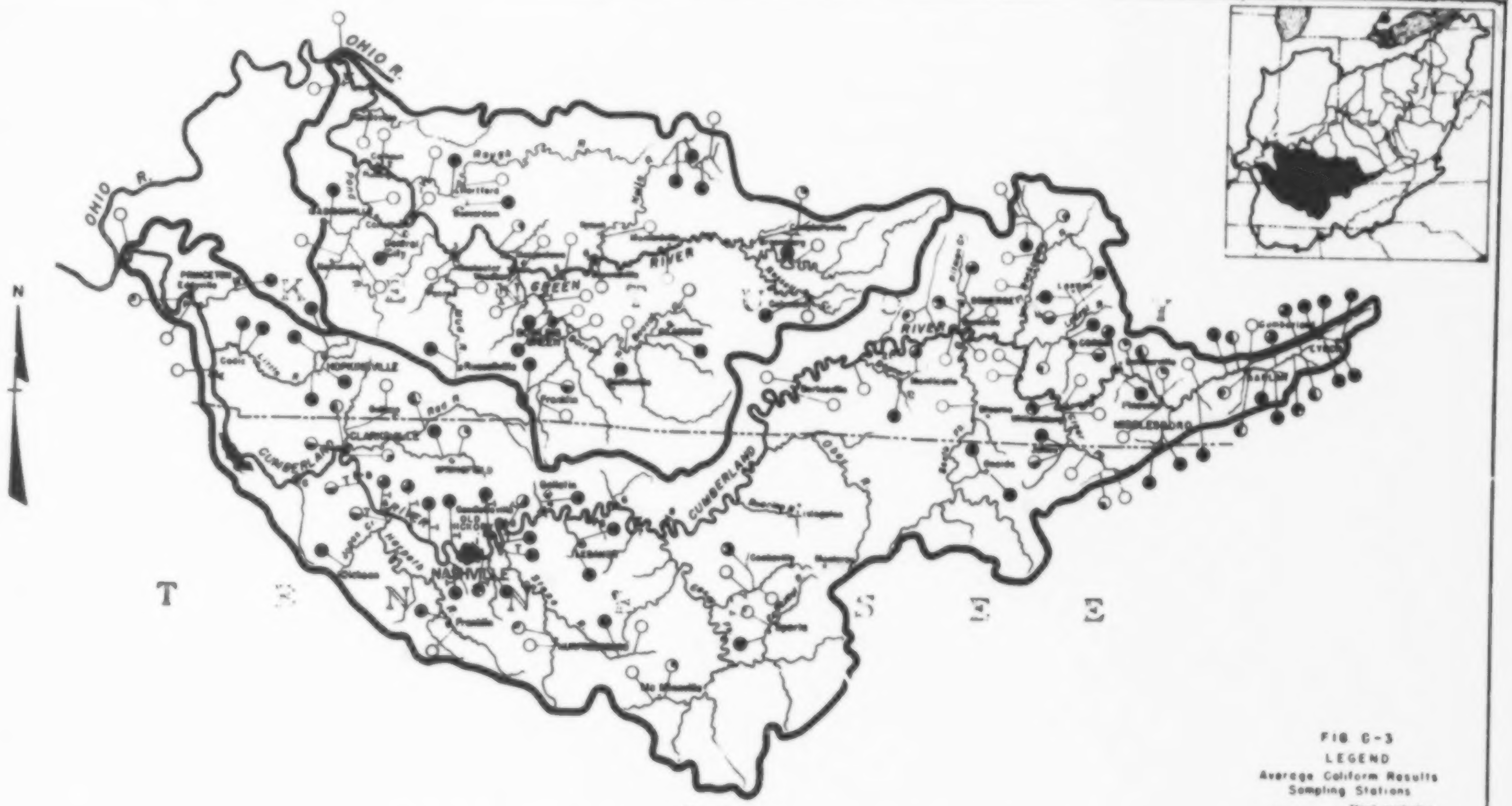
River Location	Little bel.Hopkinsville,Ky.	N.Fk.Little abv.Hopkinsville,Ky.	Sulfur Cr. bel.Springfield,Tenn.	Harpeth bel.Franklin,Tenn.	Mill Creek bel. State Hospital	W.Fk.Stone bel. Murfreesboro	Barton Cr. below Lebanon
River Miles Above:							
Conf.with Cumberland	40	49	35	68	3	42	7
Mouth of Cumberland	98	107	161	221	197	248	259
Period -	Nov.1940	Nov.1940	Nov.1940	Jan.1941	Jan.1941	Jan.1941	Jan.1941
Number of Samples	3	3	3	4	4	4	4
Flow in c.f.s.:							
Sampling Days	7	2	14	107	21	136	75
Water Temperature °C.	4.3	4.8	1.7	6.8	6.5	7.4	8.1
Coliforms per ml.	377	236	2,270	675	783	31	349
Dissolved oxygen ppm.	7.8	3.7	9.2	11.6	12.4	12.2	8.5
B.O.D., 5-day, p.p.m.	3.6	5.9	5.7	4.4	2.8	3.4	8.4

River Location	Barton Cr. abv. Lebanon, Tenn.	Barren Fork McMinnville,Tenn.		Yellow Cr. bel.Middlesboro, Ky.	Poor Fork Cumberland,Ky.		Poor Fork above Harlan, Ky.
		above	below		above	below	
River Miles Above:							
Conf.with Cumberland	9	84	83	11	22	19	1
Mouth of Cumberland	261	393	392	652	691	688	670
Period -	Jan.1941	Feb.1941	Feb.1941	Sept.1940	Sept.1940	Sept.1940	Sept.1940
Number of Samples	4	3	3	3	3	3	3
Flow in c.f.s.:							
Sampling Days	24	12	111	9	21	33	59
Water Temperature °C.	10.3	6.5	6.7	21.5	20.3	20.8	22.3
Coliforms per ml.	285	*	33	17,000	209	1,030	14
Dissolved oxygen ppm.	8.7	11.2	11.8	0.9	6.8	7.4	8.2
B.O.D., 5-day, p.p.m.	2.8	2.4	2.7	7.8	1.8	1.9	0.9

(a) Minimum day. (b) Average. (c) Average summer. (d) Minimum. (e) Maximum.

*Less than one.

Fig C-3



N
OHIO R.
OHIO R.
GREEN
RIVER
CUMBERLAND
CUMBERLAND
RIVER
NASHVILLE
CLARKSVILLE
HOPKINSVILLE
MIDDLESBORO
T E N N E S S E E

FIG C-3

LEGEND

Average Coliform Results
Sampling Stations

Symbol	Most probable number per ml
○	Under 25
◔	26 - 50
◑	51 - 100
◕	101 - 200
●	Over 200
T–○	Tennessee Health Department Data

Fig. C-3

GREEN — CUMBERLAND BASINS

COLIFORM RESULTS

10 0 10 20 30
SCALE OF MILES

OHIO RIVER POLLUTION SURVEY
U. S. PUBLIC HEALTH SERVICE
1941

Fig C-4

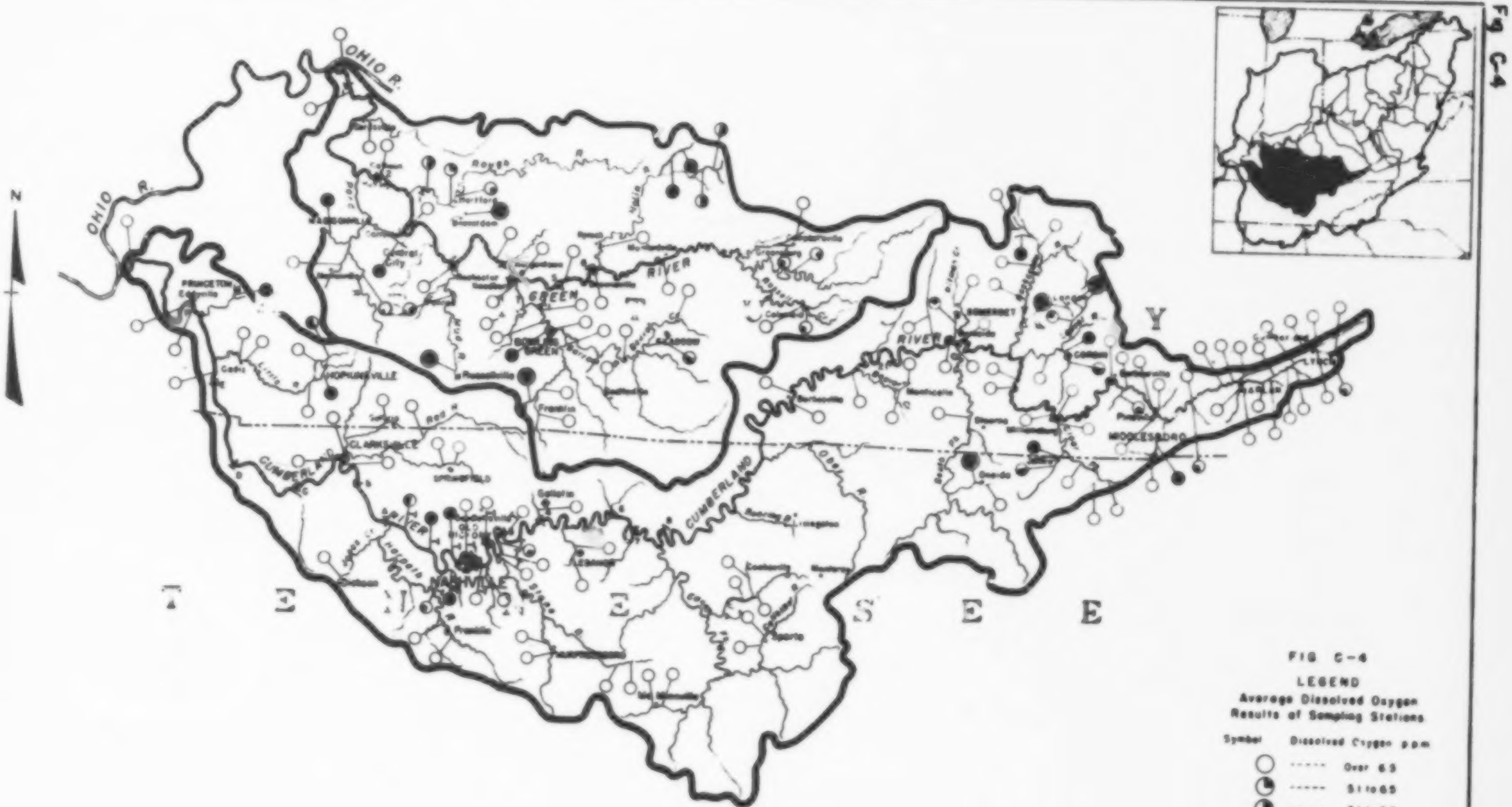

OHIO R.
OHIO R.
GREEN
RIVER
CUMBERLAND
CUMBERLAND
RIVER
PRINCETON
HOPKINSVILLE
CLARKSVILLE
NASHVILLE
SOMERSET
MIDDLESBORO
T E N N E S S E E
Y
N
FIG C-4
LEGEND
Average Dissolved Oxygen
Results of Sampling Stations
Symbol
Dissolved Oxygen p.p.m.
○ ------ Over 6.5
◔ ------ 5.1 to 6.5
◑ ------ 3.1 to 5.0
● ------ 0.1 to 3.0
● ------ 0.0
------ Tennessee Health Department Data

Fig. C-4

GREEN—CUMBERLAND BASINS

DISSOLVED OXYGEN RESULTS

10 0 10 20 30
SCALE OF MILES

OHIO RIVER POLLUTION SURVEY
U. S. PUBLIC HEALTH SERVICE
1941

Fig. C-5

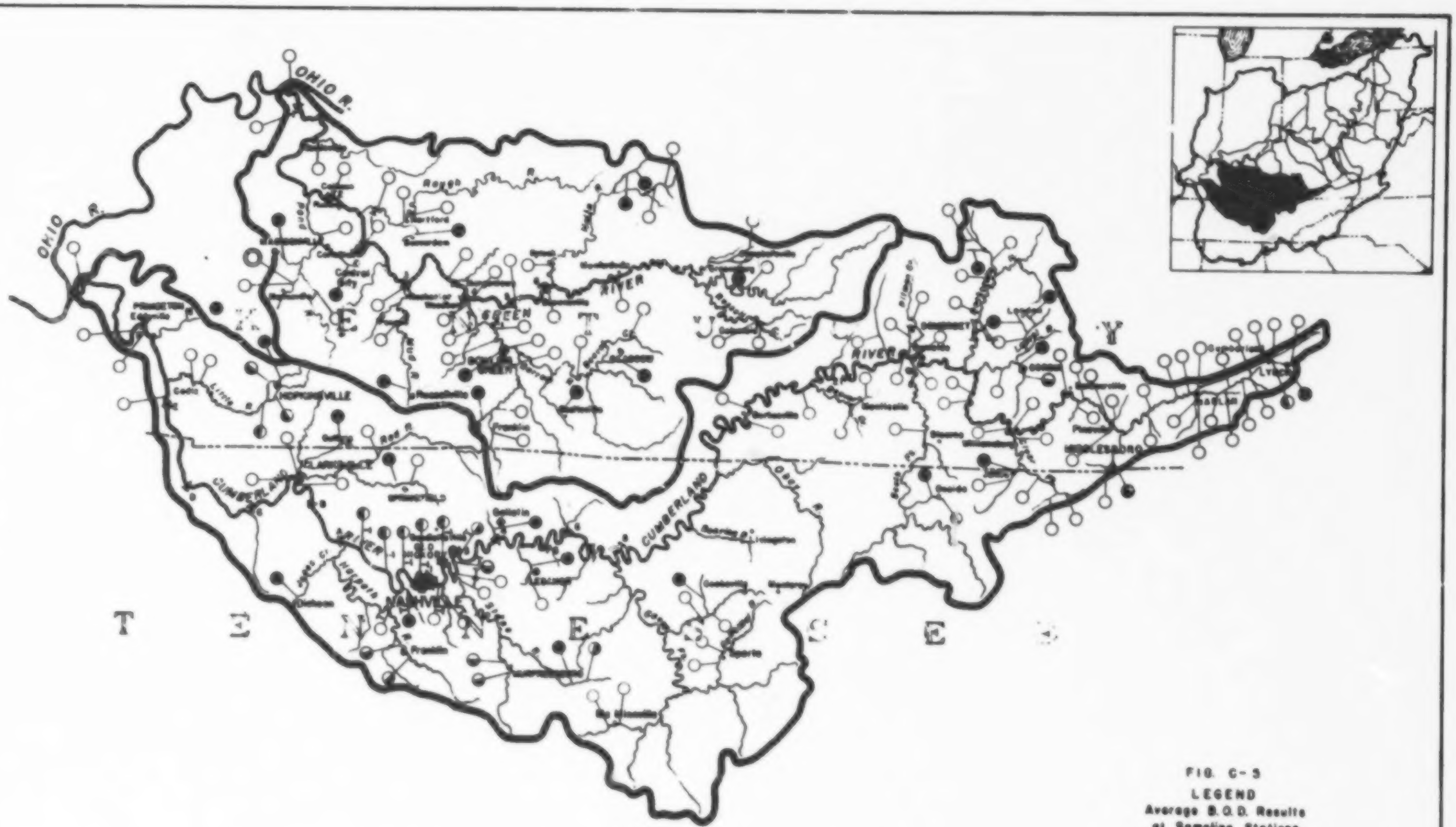

OHIO R.
OHIO R.
GREEN
RIVER
CUMBERLAND
RIVER
CUMBERLAND
HOPKINSVILLE
CLARKSVILLE
NASHVILLE
MIDDLESBORO
K E N T U C K Y
T E N N E S S E E
N

FIG. C-5
LEGEND
Average B.O.D. Results
at Sampling Stations

Symbol (Normal Samples)	p.p.m.	Acid Stream Samples (Neutralized & Seeded)
○	0.0 to 3.0	⊙
◐	3.1 to 5.0	
●	Over 5.0	
I–○	Tennessee Health Department Data.	

Fig. C-5
GREEN — CUMBERLAND BASINS
BIOCHEMICAL OXYGEN DEMAND

10 0 10 20 30
SCALE OF MILES

OHIO RIVER POLLUTION SURVEY
U. S. PUBLIC HEALTH SERVICE
1941

Hydrometric Data

Forty-eight stream gaging stations have been maintained on the Cumberland River Basin for varying periods, 25 of which are active at the present time. Eight stations of importance from a pollution standpoint have been selected and the monthly mean summer flows for the three years in which the lowest summer flows have occurred are presented in Table C-6.

Figure C-6 presents a low-flow frequency curve of the minimum monthly mean flows from June to September, inclusive, for the Cumberland River at Nashville. This curve is based, necessarily, upon past records and will not reflect conditions that may be expected when low-flow control works, now under construction, are completed. The curve indicates that the expectancy of low monthly mean summer flows is as follows:

Location	Minimum Monthly Mean Summer Flows in Cubic Ft. per Sec. that may be expected once in			
	2 years	5 years	10 years	Minimum
Nashville	2800	1700	1300	750

Low-flow Regulation - The Wolf Creek Reservoir in the Cumberland Basin is being constructed by the U. S. Engineer Department in connection with the authorized program for Ohio River flood control. The reservoir will have a maximum storage capacity of more than 5,000,000 acre-feet and will provide a minimum flow of 4,800 c.f.s. at Nashville. Two additional flood-control and power reservoirs, Dale Hollow on Obey River and Center Hill on Caney Fork River, are also under construction. These should increase further the minimum flow at Nashville.

A proposed reservoir on the Poor Fork River, a head-water tributary of the Cumberland, might be expected to benefit the water and sewerage works of the town of Cumberland, Kentucky. A minimum flow of 10 to 15 c.f.s. would be available from this reservoir.

Table C-6 Cumberland River Basin - Monthly Mean Summer Flows for Years in which Lowest Summer Flows have Occurred.

River Location	Cumberland Clarksville Tenn.	Cumberland Nashville, Tenn.	Cumberland Old Hickory, Tenn.	Obey Byrdstown, Tenn.
River Miles Above:				
Conf.with Cumberland	-	-	-	45.2
Mouth of Cumberland	126.5	191.1	218.2	426.1
Drain.Area Sq. Mi.	14,370	12,750	11,610	425
Period of Record	1922-40	1888-1931	1931-40	1919-40
Year	1925	1899	1932	1925
June c.f.s.	4,640	4,640	4,850	86
July "	4,490	3,640	16,300	45
August "	1,510	3,350	2,510	20
September "	1,100	1,180	1,910	64
Year	1936	1913	1936	1930
June "	2,119	8,650	1,086	67
July "	6,979	2,350	2,835	30
August "	2,012	2,000	924	30
September "	1,375	905	903	22
Year	1939	1925	1939	1936
June "	10,670	3,820	7,193	37
July "	8,764	3,570	7,263	31
August "	5,635	1,200	3,748	19*
September "	1,099*	796*	889*	33

River Location	Caney Fork Silver Point Tenn.	Stone Smyrna, Tenn.	Harpeth Kingston Spr. Tenn.	Red Adams, Tenn.
River Miles Above:				
Conf.with Cumberland	41.6	25	32.4	32.9
Mouth of Cumberland	350.8	231	185.3	158.4
Drain. Area Sq. Mi.	2,130	550	695	690
Period of Record	1923-40	1925-40	1925-40	1920-40
Year	1924	1925	1931	1925
June c.f.s.	2,057	-	96	370
July "	1,082	-	122	172
August "	528	20	74	83
September "	361	8*	32	61
Year	1925	1930	1935	1936
June "	920	124	264	115
July "	627	32	358	315
August "	528	36	113	165
September "	289*	33	45	78
Year	1936	1935	1936	1939
June "	339	406	61	409
July "	1,677	183	349	205
August "	366	134	69	265
September "	352	25	31	65

*Minimum Month.

Fig. C-6

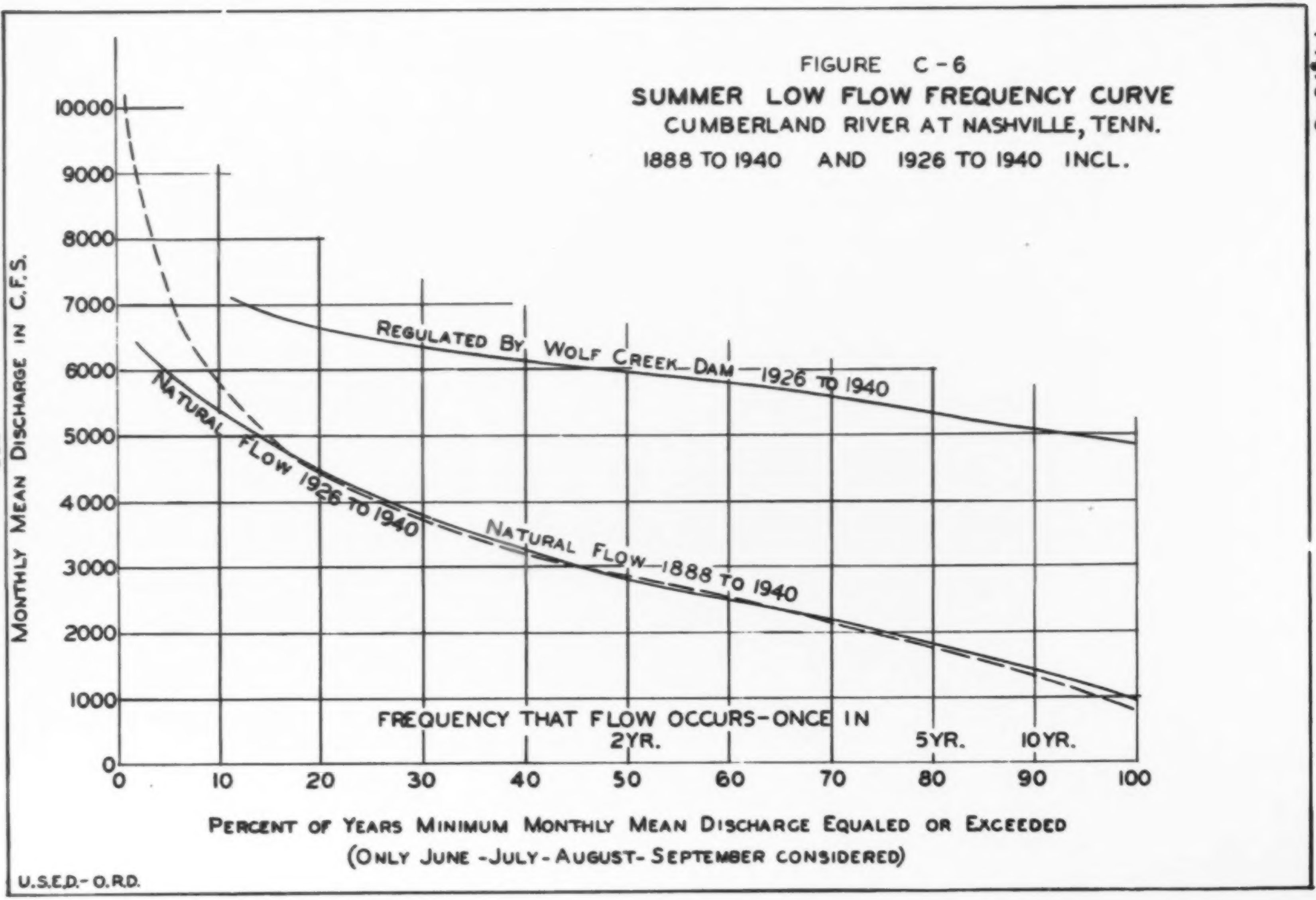


FIGURE C-6

SUMMER LOW FLOW FREQUENCY CURVE

CUMBERLAND RIVER AT NASHVILLE, TENN.

1888 TO 1940 AND 1926 TO 1940 INCL.

U.S.E.D. - O.R.D.

Discussion

The only pollution problem of serious consequence found in the Cumberland River Basin is in the Nashville area. Minor pollution, of local significance, occurs at a number of smaller communities on minor streams. Corrective measures at these points are included in the cost estimates but discussion has been omitted.

The Tennessee State Health Department has made detailed studies of the Cumberland River in the vicinity of Nashville and is preparing a report thereon. The results of their observations have been available for this report and have been freely used. Grateful appreciation is expressed for this courtesy.

Nashville and Vicinity

The 40 miles of the Cumberland River from Old Hickory to below Nashville, Tennessee, receives waste from an equivalent sewered population of 353,000, about 80 percent of the basin's total pollution load. The only effective sewage treatment in this area is at Old Hickory where the domestic sewage receives secondary treatment.

As a consequence of this pollution, conditions in the river below Nashville are definitely bad during periods of low flow. Bacteriological studies show the water to be unsuitable as a source of raw water for a public supply from Nashville downstream to Clarksville, a distance of 60-odd miles, and the river water in this area does not meet the swimming water standard (0.5 per ml.) recommended by the Tennessee Public Health Council.

Analytical studies of oxygen conditions below Nashville show dissolved oxygen values as low as 0.1 p.p.m. and oxygen demands as high as 6.6 p.p.m. Scum and floating material are observed on the water, which detracts from riparian values. Sludge blankets the stream bed for a distance of 18 miles below Nashville, preventing the propagation of fish and increasing the oxygen depletion.

At Nashville, monthly mean summer flows (June to November) have been less than 2,000 c.f.s. during 23 of the 44 years of record and less than 1,000 c.f.s. during 10 of these years. With primary treatment of the present wastes discharged to the river in the vicinity of Nashville, a minimum flow of 1,500 to

2,000 c.f.s. is desirable for dilution, the quantity depending in part on the effect of upstream pollution. Lacking this quantity of dilution water, more refined methods of waste treatment would be necessary.

The Wolf Creek Reservoir, now under construction on the Cumberland River at mile 460.9, will furnish minimum summer flows at Nashville of an estimated 4,800 c.f.s. as ultimately developed. Under these circumstances, primary treatment of sewage and equivalent treatment of industrial wastes at Nashville and Old Hickory will be adequate. The minimum tangible monetary benefit of the increase in low flow, computed as equivalent to savings in treatment cost in the Nashville area, amounts to $50,000 annually. Other benefits, that are highly desirable but incapable of invoice in dollars, are:

(1) Higher dissolved oxygen residuals in the vicinity of Nashville, improving the stream as a habitat for aquatic life.

(2) Dilution for potential increases in pollution loads.

Cost estimates for remedial measures for pollution abatement suggested, as justified by the stream uses, are summarized on Table C-1.

TABLE C-7 CUMBERLAND RIVER BASIN

OHIO RIVER POLLUTION SURVEY
LABORATORY DATA

SUMMARY OF INDIVIDUAL RESULTS

Sampling Point	Mileage from Mouth		Date 1940	Average Discharge c.f.s.	Temp. °C	Dissolved Oxygen p.p.m.	Dissolved Oxygen % Sat.	5 Day B.O.D. p.p.m.	Coliforms M.P.N. Per ml	pH	Turbidity p.p.m.	Alkalinity p.p.m.	Hardness p.p.m.
Poor Fork - Above Cumberland, Ky.	CPf	691	Aug. 28	21	22.0	6.3	71.3	0.6	75	7.3	7	54	
" "	"	"	Sept. 4	21	18.5	7.3	77.3	1.0	93	7.3	8	42	26
" "	"	"	" 10	21	20.5	6.8	74.9	3.7	460	7.6	25	90	
Looney Creek - ½ mile Above Lynch, Kentucky	CPfL	696	Aug. 28	2	20.5	8.3	91.4	0.6	46	7.7	7	80	
" "	"	"	Sept. 4	5	16.5	9.4	95.9	0.5	9	7.4	10	50	26
" "	"	"	" 10	4	19.0	8.5	91.8	1.8	1,100	7.6	80	70	
Looney Creek - below city limits, Lynch, Ky.	CPfL	694	Aug. 28	4	20.0	4.2	45.9	17.2	4,300	7.9	15	336	
" "	"	"	Sept. 4	8	17.0	7.8	79.6	20.1	4,600	7.8	25	152	52
" "	"	"	" 10	6	19.5	5.3	57.0	19.8	4,600	7.8	50	242	
Looney Creek - Mouth Cumberland, Ky.	CPfL	691	Aug. 28	10	21.0	8.4	93.4	4.3	430	8.1	10	236	
" "	"	"	Sept. 4	14	17.0	9.4	96.5	2.8	930	8.1	5	156	66
" "	"	"	" 10	11	19.5	7.0	75.8	6.4	910	7.7	60	182	
Poor Fork - 1 mile bel. Cumberland, Kentucky	CPf	688	Aug. 28		22.5	7.7	88.0	1.2	240	7.8	7	104	
" "	"	"	Sept. 4		19.5	8.0	86.8	1.2	460	7.4	5	52	30
" "	"	"	" 10		20.5	6.5	71.7	3.4	2,400	7.6	95	104	
Poor Fork - water plant intake-Above Harlan, Ky.	CPf	670	Aug. 27	71	26.0	8.3	101.0	1.0	9	7.5	5	60	40
" "	"	"	Sept. 3	76	21.0	8.7	97.2	1.0	9	7.3	13		52
" "	"	"	" 9	31	20.0	7.6	82.7	0.8	24	7.7	5	84	
Clover Fork - Above Closplint, Kentucky	CClf	688	Aug. 29	10	21.5	8.4	94.3	0.8	23	7.3	5	28	
" "	"	"	Sept. 5	14	18.5	8.8	93.2	0.7	93	7.2	5	28	38
" "	"	"	" 11	12	13.5	9.0	85.9	0.9	43	7.2	5	36	
Fugitt Creek At Mouth	CClfF	687	Aug. 29	1	21.0	8.4	93.2	0.8	150	7.7	100	104	
" "	"	"	Sept. 5	2	18.5	9.0	95.2	0.8	43	7.7	20	104	[illegible]
" "	"	"	" 11	2	13.5	9.4	89.3	2.1	240	7.8	50	112	
Clover Fork - Below Louellen, Kentucky	CClf	685	Aug. 29	12	21.0	8.0	88.7	0.9	93	7.3	5	42	
" "	"	"	Sept. 5	16	18.0	8.9	92.9	0.8	150	7.3	8	36	42
" "	"	"	" 11	14	13.5	9.1	86.8	0.8	240	7.4	10	42	
Clover Fork - ½ mile Above Evarts, Ky.	CClf	679	Aug. 29	18	22.5	7.8	89.1	1.0	240	7.4	8	40	
" "	"	"	Sept. 5	22	19.0	8.1	88.6	0.7	43	7.3	8	36	56
" "	"	"	" 11	19	13.5	8.4	80.0	1.0	150	7.3	25	36	
Yocum Creek At Mouth	CClfY	679	Aug. 29	4	22.5	8.8	100.6	1.2	240	7.7	8	104	
" "	"	"	Sept. 5	12	19.5	10.0	108.2	1.2	93	8.2	5	96	88
" "	"	"	" 11	4	13.5	9.0	85.4	1.9	1,100	7.7	8	106	
Clover Fork - ½ mile Below Evarts, Kentucky	CClf	677	Aug. 29	22	23.0	8.6	98.5	1.1	930	7.5	5	44	
" "	"	"	Sept. 5	33	20.5	9.1	99.9	1.9	93	7.4	5	38	62
" "	"	"	" 11	23	14.0	9.2	89.2	2.1	460	7.3	25	34	

TABLE C-7 CUMBERLAND RIVER BASIN

OHIO RIVER POLLUTION SURVEY
LABORATORY DATA

SUMMARY OF INDIVIDUAL RESULTS

Sampling Point	Mileage From Mouth		Date 1940	Average Discharge c.f.s.	Temp. °C	Dissolved Oxygen		5 Day B.O.D. p.p.m.	Coliform M.P.N. Per ml	pH	Turbidity p.p.m.	Alkalinity p.p.m.	Hardness p.p.m.
						p.p.m.	% Sat.						
Clover Fork - above Harlan, Kentucky	CClf	672	Aug. 28	24	24.5	8.3	98.6	0.6	93	7.6	5	50	
" "	"	"	Sept. 3	52	20.0	8.7	94.9	0.7	93	7.5	8	40	44
" "	"	"	" 9	19	19.0	6.8	72.4	0.8	39	7.6	5	56	
Martin's Fork - Mouth above city limits Harlan, Kentucky	CClfM	672	Aug. 28	12	25.0	7.6	90.3	1.1	24	7.6	5	68	
" "	"	"	Sept. 3	30	20.0	8.3	90.1	0.7	36	7.6	10	50	38
" "	"	"	" 9	11	15.0	7.7	82.1	1.1	43	7.4	8	70	
Cumberland River - ½ mi. below Harlan, Kentucky	C	669	Aug. 27	106	26.5	7.0	86.6	1.3	75	7.4	7	68	46
" "	"	"	Sept. 3	82	18.0	8.0	83.4	1.4	43	7.4	13	48	
" "	"	"	" 9	30	19.5	5.6	60.4	0.8	93	7.3	8	62	
Cumberland River Below - Loyall, Ky.	C	654	Aug. 27		26.5	5.8	70.9	1.4	460	7.4	10	58	46
" "	"	"	Sept. 3		18.0	6.9	72.1	0.8	240	7.3	15	46	
" "	"	"	" 9		19.5	7.1	76.3	1.0	93	7.8	10	70	
Puckett Creek - Mouth R.R.Bridge-Cardinal,Ky.	CP	654	Aug. 27	3	25.5	5.2	62.7	1.4	1,100	7.5	45	90	104
" "	"	"	Sept. 3	3	17.5	7.3	75.7	0.9	23	7.6	13	82	
" "	"	"	" 9	1	19.0	7.0	75.1	1.2	23	7.6	8	92	
Cumberland R.-Bridge on Rte. No. 72 Cardinal, Kentucky	C	653	Aug. 27	154	29.0	7.6	97.6	0.8	2	7.3	8	46	42
" "	"	"	Sept. 3	219	18.5	7.7	81.1	0.7	23	7.3	15	44	
" "	"	"	" 9	67	19.0	7.3	78.2	0.6	15	7.7	5	60	
Yellow Cr. - Bridge abv. Lake - Middlesboro, Ky.	CY	655	Aug. 27	2	21.0	6.6	73.4	0.4	43	7.2	12	64	148
" "	"	"	" 30	15	22.0	7.7	86.9	0.9	1,100	7.4	20	58	
" "	"	"	Sept. 6	2	19.0	6.7	71.4	0.6	23	7.6	10	56	
Yellow Cr. - R.R. Bridge 1 mi. below Middlesboro	CY	652	Aug. 27	6	23.0	0.4	4.6	10.6	46,000	7.1	35	100	100
" "	"	"	" 30	14	22.5	0.7	8.3	8.2	4,300	7.2	65	88	
" "	"	"	Sept. 6	5	19.0	1.7	17.8	4.6	910	7.2	65	94	
Cumberland R. - ¼ mile Above Pineville, Ky.	C	637	Aug. 26	174	26.5	7.7	95.0	0.9	46	7.3	8	36	40
" "	"	"	" 30	181	24.0	7.4	87.3	0.5	4	7.5	5	46	
" "	"	"	Sept. 6	137	20.5	7.5	83.0	0.4	2	7.7	15	46	
Straight Creek - ½ mi. Above Mouth	CS	637	Aug. 26	7	26.5	8.2	100.4	0.9	75	7.3	5	54	52
" "	"	"	" 30	13	24.0	7.5	88.2	0.6	43	7.6	5	70	
" "	"	"	Sept. 6	4	20.0	7.1	77.1	0.5	23	7.5	5	56	
Cumberland River - Below Pineville, Kentucky	C	636	Aug. 26	181	26.5	7.9	97.1	0.7	93	7.3	8	42	38
" "	"	"	" 30	194	24.5	7.5	88.8	0.4	93	7.5	5	50	
" "	"	"	Sept. 6	141	21.5	7.6	85.4	0.7	7	7.5	8	46	
Cumberland River - Above Barbourville, Kentucky	C	625	Aug. 26	242	25.5	7.2	87.3	0.7	43	7.2	15	42	38
" "	"	"	" 30	165	27.5	7.4	92.2	0.4	39	7.5	8	40	
" "	"	"	Sept. 6	164	23.0	7.1	81.8	0.9	9	7.6	5	62	

TABLE C-7 CUMBERLAND RIVER BASIN

OHIO RIVER POLLUTION SURVEY
LABORATORY DATA

SUMMARY OF INDIVIDUAL RESULTS

Sampling Point	Mileage From Mouth	Date 1940	Average Discharge c.f.s.	Temp. °C	Dissolved Oxygen p.p.m.	Dissolved Oxygen % Sat.	5 Day B.O.D. p.p.m.	Coliforms M.P.N. Per ml.	pH	Turbidity p.p.m.	Alkalinity p.p.m.	Hardness p.p.m.
Brush Creek Above Mouth	CB 625	Aug. 26	**	24.0	6.2	72.9	1.5	4	6.9	12	48	120
" "	" "	" 30	3	27.5	5.1	64.2	1.9	240	7.0	10	64	
" "	" "	Sept. 6	1	23.5	6.7	78.0	1.0	460	7.3	15	60	
Cumberland River - bel. mouth Richland Creek	C 620	Aug. 26	242	24.5	7.2	85.8	1.7	8	7.0	5	36	36
" "	" "	" 30	168	27.0	7.6	94.2	1.6	110	7.3	8	42	
" "	" "	Sept. 6	164	25.5	7.9	95.1	1.4	240	7.7	5	60	
Clear Fork - Below Anthras, Tennessee	CCf 605	Sept. 13	1	12.0	7.9	72.9	1.7	9	7.7	12	76	178
" "	" "	" 18	**	14.0	7.2	69.2	0.9	15	7.5	13	70	
" "	" "	" 23	**	19.0	5.8	62.0	1.1	43	7.4	10	90	
Hickory Creek - Below Morley, Tennessee	CCfH 604	Sept. 13	2	11.5	9.6	87.6	1.0	23	7.5	130	64	72
" "	" "	" 18	1	14.0	7.2	69.4	4.4	15	7.7	250	72	
" "	" "	" 23	**	19.0	7.1	75.9	2.2	46	7.6	240	68	
Clear Fork - 5 miles south of Jellico, Tenn.	CCf 602	Sept. 13	4	11.0	8.7	78.5	0.8	4	7.5	10	44	76
" "	" "	" 18	2	16.0	7.9	79.4	0.8	2	7.6	10	50	
" "	" "	" 23	1	18.5	6.8	72.0	1.3	46	7.5	8	54	
Elk Creek - Above Jellico City, Tenn.	CCfE 598	Sept. 13	1	13.5	6.5	62.3	5.9	43	7.7	15	168	110
" "	" "	" 18	1	17.0	5.2	53.5	1.4	240	7.7	15	188	
" "	" "	" 23	**	18.5	3.3	35.1	1.2	9	7.6	10	220	
Elk Creek - ½ mile Bel. Jellico City, Tenn.	CCfE 597	Sept. 13	1	14.0	2.0	18.8	57.4	4,300	7.5	10	180	106
" "	" "	" 18	1	17.5	1.7	17.5	544.	930	7.4	10	192	
" "	" "	" 23	**	19.0	0.9	9.2	16.4	430	7.6	10	222	
Clear Fork - Above Mouth Williamsburg, Kentucky	CCf 582	Sept. 13	7	15.5	8.0	80.1	1.2	4	7.5	12	58	72
" "	" "	" 18	4	21.0	7.9	87.7	0.8	4	7.6	15	56	
" "	" "	" 23	2	21.5	7.0	78.6	0.3	9	7.5	13	64	
Cumberland River water plant intake Above Williamsburg, Ky.	C 579	Sept. 13	130	18.5	9.2	97.7	0.8	4	7.7	7	56	52
" "	" "	" 18	83	23.0	9.4	108.3	1.3	2	7.9	8	58	
" "	" "	" 23	52	21.0	8.7	102.0	0.4	4	7.7	5	54	
Cumberland River - ½ mi. Below Williamsburg, Ky.	C 577	Sept. 13	130	18.0	8.6	90.6	0.7	93	7.6	10	60	54
" "	" "	" 18	83	22.5	8.4	96.3	2.0	240	7.6	15	62	
" "	" "	" 23	52	22.5	6.8	78.1	1.6	150	7.4	5	54	
Cumberland River - Above Cumberland Falls, Ky.	C 554	Sept. 17	130	14.5	8.5	83.0	1.6	1	7.7	8	50	48
" "	" "	" 20	92	19.0	8.0	85.9	1.2	2	7.6	5	54	
" "	" "	" 25	100	16.0	7.6	76.7	0.9	4	7.6	8	54	
Cumberland River - Bel. Cumberland Falls, Ky.	C 552	Sept. 17	130	14.0	8.6	83.2	1.4	9	7.6	5	48	50
" "	" "	" 20	92	20.0	8.2	89.4	1.0	2	7.7	5	48	
" "	" "	" 25	100	15.5	7.5	74.9	0.9	9	7.5	10	58	

TABLE C-7 CUMBERLAND RIVER BASIN

OHIO RIVER POLLUTION SURVEY
LABORATORY DATA

SUMMARY OF INDIVIDUAL RESULTS

Sampling Point	Mileage From Mouth	Date 1940	Average Discharge c.f.s.	Temp. °C	Dissolved Oxygen p.p.m.	Dissolved Oxygen % Sat.	5 Day B.O.D. p.p.m.	Coliform M.P.N. Per ml	pH	Turbidity p.p.m.	Alkalinity p.p.m.	Hardness p.p.m.
King Branch-Laurel R. below London, Kentucky	CLLiK 577	Sept.16	••	20.0	0.0	00.0	71.6	460,000	7.4	140	568	78
" "	" "	" 19	••	26.5	0.0	00.0	737.	93,000	7.2	210	550	
" "	" "	" 24	••	26.0	0.0	00.0	186.	240,000	7.2	180	442	
Town Branch-Laurel R. below London, Kentucky	CLLiT 576	Sept.16	••	21.0	0.0	00.0	783.	240,000	7.3	130	552	92
" "	" "	" 19	••	26.5	0.0	00.0	404.	23,000	8.3	200	558	
" "	" "	" 24	••	25.0	0.0	00.0	670.	230,000	7.1	260	496	
Little Laurel River 4 mi. below London, Ky.	CLLi 572	Sept.16	••	21.0	6.4	71.2	2.4	93	7.1	25	40	30
" "	" "	" 19	••	27.0	5.8	72.2	2.6	15	7.1	50	48	
" "	" "	" 24	••	24.5	5.7	67.7	2.9	150	7.1	35	42	
Lynn Camp Creek-Above Corbin, Kentucky	CLLc 563	Sept.17	••	14.5	4.3	41.7	2.3	9	6.9	75	34	30
" "	" "	" 20	••	16.0	4.0	39.9	5.3	9	6.7	70	30	
" "	" "	" 25	••	16.5	4.9	49.5	3.3	240	7.3	65	32	
Lynn Camp Creek - Below Corbin, Kentucky	CLLc 562	Sept.17	1	17.0	0.0	00.0	20.0	230,000	7.3	65	252	72
" "	" "	" 20	1	15.5	0.0	00.0	155.	240,000	7.1	80	240	
" "	" "	" 25	1	19.0	1.2	12.4	53.2	23,000	6.9	250	88	
Laurel River Barton's Mills, Ky.	CL 556	Sept.17	1	13.0	7.4	69.8	1.5	2	7.4	10	44	30
" "	" "	" 20	1	17.0	7.3	74.6	1.1	46	7.6	15	98	
" "	" "	" 25	4	17.0	6.6	68.2	1.9	46	7.6	15	102	
Town Branch - Above Mt. Vernon, Kentucky	CRRcT 594	Sept.16	••	16.0	9.0	90.4	2.4	4	8.1	15	114	98
" "	" "	" 19	••	18.0	9.2	96.9	2.7	1	8.1	8	110	
" "	" "	" 24	••	21.5	9.8	110.0	2.0	1	8.1	15	106	
Town Branch Below Mt. Vernon, Ky.	CRRcTb 591	Sept.16	••	15.0	3.8	37.7	29.5	15,000	7.5	20	224	180
" "	" "	" 19	••	17.5	2.8	29.0	71.7	23,000	7.5	15	226	
" "	" "	" 24	••	21.5	1.1	12.2	26.6	75,000	7.5	13	234	
Roundstone Creek - Below Withers, Kentucky	CRo 584	Sept.16	6	15.0	7.8	77.2	1.5	23	7.6	20	112	78
" "	" "	" 19	4	18.0	7.9	82.6	2.0	46	7.7	10	114	
" "	" "	" 24	3	21.0	6.8	76.0	0.6	15	7.7	15	118	
Rockcastle River - Bel. Livingston, Kentucky	CR 578	Sept.16	16	16.5	7.8	79.2	1.2	4	7.5	20	78	74
" "	" "	" 19	10	20.5	7.8	85.9	1.6	46	7.5	13	82	
" "	" "	" 24	4	23.0	7.9	91.5	1.0	4	7.6	15	84	
Rockcastle River-Bridge on London to Somerset Rd.	CR 566	Sept.16	28	19.5	8.4	90.9	1.5	4	7.7	10	78	80
" "	" "	" 19	20	25.0	8.1	97.0	2.2	2	7.8	10	90	
" "	" "	" 24	12	25.0	8.1	96.2	0.8	9	7.7	10	84	
Buck Creek East Somerset, Kentucky	CB 548	Sept.27	20	7.5	8.8	73.2	1.1	75	7.5	35	70	64
" "	" "	Oct. 1	5	11.0	9.2	83.4	1.3	4	7.7	8	82	
" "	" "	" 3	3	12.0	9.4	86.3	0.7	8	7.6	8	86	

TABLE C-7 CUMBERLAND RIVER BASIN

OHIO RIVER POLLUTION SURVEY
LABORATORY DATA

SUMMARY OF INDIVIDUAL RESULTS

Sampling Point	Mileage From Mouth	Date 1940	Average Discharge c.f.s.	Temp. °C	Dissolved Oxygen p.p.m.	Dissolved Oxygen % Sat.	5 Day B.O.D. p.p.m.	Coliform M.P.N. Per ml	pH	Turbidity p.p.m.	Alkalinity p.p.m.	Hardness p.p.m.
Cumberland River - Above Burnsides, Ky.	C 517	Sept.26	190	15.0	8.4	82.8	1.0	4	7.5	5	50	46
" "	" "	" 30	240	12.5	8.9	83.5	0.8	1	7.7	8	50	
" "	" "	Oct. 2	250	13.5	8.9	84.9	1.4	1	7.8	8	54	
Pine Creek - Above Oneida, Tennessee	CSfP 590	Sept.26	**	11.0	4.3	38.4	6.6	11,000	7.1	320	46	42
" "	" "	" 30	**	19.5	9.4	101.6	3.8	30	7.5	20	58	
" "	" "	Oct. 2	**	10.5	6.5	57.8	3.1	43	7.4	30	62	
Pine Creek - Below Oneida, Tennessee	CSfP 589	Sept.26	**	11.0	0.0	00.0	61.6	43,000	6.5	260	88	80
" "	" "	" 30	**	20.0	0.0	00.0	191	43,000	7.5	110	192	
" "	" "	Oct. 2	**	10.0	0.0	00.0	153	43,000	6.8	85	226	
South Fork At Yamacraw	CSf 553	Sept.26	130	11.5	7.9	72.1	0.9	23	7.1	15	18	28
" "	" "	" 30	87	18.5	7.8	82.5	Broke	24	7.1	5	16	
" "	" "	Oct. 2	61	9.5	8.1	70.9	1.1	4	7.0	5	18	
South Fork - Mouth Burnsides, Ky.	CSf 517	Sept.26	160	15.0	8.9	87.6	0.6	9	7.3	8	28	26
" "	" "	" 30	120	12.5	9.1	84.6	0.6	**	7.4	8	30	
" "	" "	Oct. 2	92	14.0	9.1	87.4	1.0	4	7.5	5	32	
Pittman Creek - Above Somerset, Kentucky	CPc 527	Sept.27	2	9.0	8.4	72.1	2.0	460	7.5	100	90	88
" "	" "	Oct. 1	**	11.5	8.0	73.4	1.4	9	7.6	35	114	
" "	" "	" 3	**	14.5	8.2	79.4	1.0	9	7.7	18	104	
Sinking Creek - Below Somerset - At Ferguson	CPcSc 520	Sept.27	2	10.5	6.0	53.5	5.1	93	7.6	8	150	142
" "	" "	Oct. 1	1	12.0	7.4	67.9	8.4	150	7.7	5	168	
" "	" "	" 3	1	12.5	6.0	56.3	8.2	93	8.1	15	124	
Cumberland River -Below mouth of Pittman Creek Burnsides, Kentucky	C 515	Sept.26	350	15.0	7.6	75.2	1.0	23	7.5	13	48	44
" "	" "	" 30	350	21.5	9.3	104.6	1.1	2	7.6	8	46	
" "	" "	Oct. 2	350	19.0	8.9	95.6	1.0	1	7.6	8	46	
Fishing Creek - west of Somerset, Kentucky	CF 516	Sept.27	15	16.0	9.1	91.5	1.6	93	7.6	25	86	86
" "	" "	Oct. 1	6	18.5	9.0	95.8	1.2	4	7.7	10	72	
" "	" "	" 3	4	13.5	7.7	73.3	0.7	43	7.7	8	88	
Elk Creek - Above Monticallo, Kentucky	CBcE 488	Sept.26	3	14.0	10.1	97.7	1.5	240	7.8	10	120	120
" "	" "	" 30	1	14.5	12.3	119.5	0.7	9	7.8	8	142	
" "	" "	Oct. 2	1	17.0	10.5	108.2	1.9	93	7.9	15	142	
Elk Creek - Below Monticello, Kentucky	CBcE 486	Sept.26	3	15.0	10.4	102.9	1.7	230	7.7	5	156	144
" "	" "	" 30	1	13.5	9.5	91.0	1.9	240	7.7	8	154	
" "	" "	Oct. 2	1	15.5	10.4	103.5	2.7	430	7.8	15	152	
Cumberland River Rowena Ferry	C 464	Sept.27	480	16.0	7.1	71.4	1.6	23	7.5	35	50	52
" "	" "	Oct. 1	370	15.0	8.8	86.7	1.6	2	7.6	10	52	
" "	" "	" 3	340	13.5	8.1	77.2	0.9	2	7.4	15	46	

TABLE C-7 CUMBERLAND RIVER BASIN

OHIO RIVER POLLUTION SURVEY
LABORATORY DATA

SUMMARY OF INDIVIDUAL RESULTS

Sampling Point	Mileage From Mouth	Date 1940	Average Discharge c.f.s.	Temp. °C	Dissolved Oxygen p.p.m.	Dissolved Oxygen % Sat.	5 Day B.O.D. p.p.m.	Coliform M.P.N. Per ml	pH	Turbidity p.p.m.	Alkalinity p.p.m.	Hardness p.p.m.
Cumberland River -Above Burkesville, Kentucky	C 428	Oct. 7	258	19.0	8.3	88.7	0.9	1	7.6	10	56	94
" "	" "	" 11	187	13.5	8.7	83.0	4.8	**	7.5	13	60	
" "	" "	" 17	200	8.0	8.4	70.9	0.5	2	7.4	5	56	
Cumberland River -Below Burkesville, Kentucky	C 426	Oct. 7	258	18.0	8.3	87.2	0.7	2	7.6	10	60	94
" "	" "	" 11	187	12.5	8.7	81.5	1.4	**	7.4	13	56	
" "	" "	" 17	200	8.5	8.6	73.5	0.8	2	7.4	10	56	
Calfkiller River -Above Sparta, Tennessee	CCfCa 396	1941 Feb. 4	158	7.0	11.6	95.2	3.9	**	7.5	5	89	71
" "	" "	" 6	134	8.0	11.4	95.7	0.7	**	7.5	5	88	
" "	" "	" 10	128	6.0	11.9	95.4	2.5	2	7.5	5	95	
Calfkiller River -Below Sparta, Tennessee	CCfCa 394	Feb. 4	160	7.0	11.2	91.7	1.6	930	7.5	5	83	66
" "	" "	" 6	143	8.0	11.2	94.7	1.7	930	7.5	10	88	
" "	" "	" 10	100	6.0	11.6	92.9	5.8	930	7.5	5	79	
Barren Fork River-water works above McMinnville	CCfBaf-393	Feb. 3	84	7.0	10.8	88.4	3.5	1	7.4	10	78	60
" "	" "	" 5	169	7.0	11.5	94.8	2.0	**	7.5	10	89	
" "	" "	" 7	81	5.5	11.3	89.6	1.7	1	7.4	5	92	
Barren Fork River - Dam Below McMinnville, Tenn.	CCfBaf-392	Feb. 3	83	7.0	11.6	95.6	3.8	43	7.5	10	76	55
" "	" "	" 5	169	7.5	11.9	99.0	2.0	43	7.6	10	114	
" "	" "	" 7	81	5.5	11.8	93.2	2.3	14	7.4	5	94	
Falling Water River Abv. Cookeville, Tennessee	CCfFw 358	Feb. 4	25	5.0	11.5	89.8	1.6	1	7.5	5	109	81
" "	" "	" 6	26	7.0	11.4	93.7	1.0	1	7.5	10	120	
" "	" "	" 10	21	3.0	12.0	89.2	2.3	**	7.5	5	103	
Pigeon Roost Creek-Below Cookeville, Tennessee	CCfFwP 362	Feb. 6	7	10.0	7.8	68.7	6.1	230	7.5	10	122	
" "	" "	" 10	7	7.5	7.4	61.7	12.5	150	7.4	5	112	
Falling Water River Below Cookeville, Tenn.	CCfFw 356	Feb. 4	38	5.0	11.3	88.4	1.5	4	7.5	5	110	81
" "	" "	" 6	37	7.0	10.9	89.6	0.6	4	7.5	10	118	
" "	" "	" 10	35	3.5	11.4	85.7	3.3	9	7.5	5	105	
Barton Creek - Above Lebanon, Tenn.	CB 261	Jan. 22	4	11.0	8.2	73.8	6.4	930	7.4	10	188	170
" "	" "	" 24	82	13.0	8.2	77.0	2.1	150	7.3	200	185	
" "	" "	" 28	8	8.0	8.9	75.3	1.2	36	7.4	5	200	
" "	" "	" 30	4	9.0	9.5	81.6	1.5	23	7.5	5	194	
Barton Creek - Below Lebanon, Tenn.	CB 259	Jan. 22	4	9.0	11.6	100.4	6.9	**	7.6	5	204	151
" "	" "	" 24	258	10.0	7.0	62.0	16.7	430	7.4	550	119	
" "	" "	" 28	18	6.5	7.3	59.3	6.2	930	7.5	5	203	
" "	" "	" 30	10	7.0	8.0	65.7	3.7	36	7.5	5	194	
N.Fork Station Camp Crk. Below Gallatin, Tenn.	CScNf 240	Jan. 22	1	11.0	4.7	42.2	37.4	1,500	7.4	15	228	191
" "	" "	" 24	56	8.0	10.4	88.0	12.8	930	7.3	440	74	

TABLE C-7 CUMBERLAND RIVER BASIN

OHIO RIVER POLLUTION SURVEY
LABORATORY DATA

SUMMARY OF INDIVIDUAL RESULTS

Sampling Point	Mileage From Mouth	Date 1961	Average Discharge c.f.s.	Temp. °C	Dissolved Oxygen		5 Day B.O.D. p.p.m.	Coliforms M.P.N. Per ml	pH	Turbidity p.p.m.	Alkalinity p.p.m.	Hardness p.p.m.
					p.p.m.	% Sat						
N.Fork Station Camp Crk. Below Gallatin, Tenn.	CScNf 240	Jan. 28	10	7.0	11.2	91.7	4.1	36	7.5	10	159	
" "	" "	" 30	10	6.0	11.3	90.4	5.0	23	7.6	15	169	
West Fork Stone River Above Woodbury, Tenn.	CStWf 271	Feb. 3	19	7.0	11.9	97.6	8.7	4	7.7	5	136	134
" "	" "	" 5	16	8.0	12.5	105.5	1.7	2	7.9	5	139	
" "	" "	" 7	14	6.0	12.1	97.3	2.2	8	7.8	63	144	
West Fork Stone River Below Woodbury, Tenn.	CStWf 269	Feb. 3	19	8.0	10.9	91.8	5.7	93	7.6	10	139	140
" "	" "	" 5	16	8.0	11.5	96.7	8.4	2,400	7.4	10	160	
" "	" "	" 7	14	7.0	10.6	87.4	7.9	9	7.6	10	158	
West Fork Stone River Above Murfreesboro, Tenn.	CStWf 252	Jan. 22	22	9.5	12.2	106.5	3.8	2	7.9	5	166	125
" "	" "	" 24	220	10.0	10.3	90.9	4.7	24	7.7	40	152	
" "	" "	" 28	160	5.0	11.6	90.9	3.5	24	7.7	45	180	
" "	" "	" 30	90	6.0	12.5	100.3	3.9	23	8.1	20	189	
West Fork Stone River Below Murfreesboro, Tenn.	CStWf 248	Jan. 22	27	7.5	12.6	105.2	4.9	2	7.8	5	164	129
" "	" "	" 24	250	10.0	11.9	105.4	3.2	4	8.0	5	168	
" "	" "	" 28	170	6.0	11.7	93.9	3.2	110	7.7	40	177	
" "	" "	" 30	54	6.0	12.6	101.0	2.3	9	8.1	15	183	
Mill Creek - ½ mile Below Nashville State Hospital	CM 197	Jan. 23	6	9.0	11.7	100.6	5.0	460	7.9	5	155	149
" "	" "	" 27	30	7.0	11.5	94.8	2.0	930	8.0	15	200	
" "	" "	" 29	30	4.0	12.9	98.2	1.5	1,500	8.0	5	214	
" "	" "	" 31	22	6.0	13.4	107.4	2.7	240	8.1	5	216	
Harpeth River - Above Franklin, Tenn.	CHr 223	Jan. 23	19	9.0	11.7	101.1	4.7	1	8.1	5	161	131
" "	" "	" 27	158	8.0	10.8	91.2	4.3	24	7.9	45	160	
" "	" "	" 29	101	4.0	12.2	93.1	0.9	2	7.9	20	179	
" "	" "	" 31	57	7.0	12.3	101.2	3.1	1	8.0	10	168	
Harpeth River - Below Franklin, Tennessee	CHr 221	Jan. 23	27	9.0	11.1	95.9	7.0	1,100	7.9	5	171	131
" "	" "	" 27	206	8.0	10.7	90.5	3.5	430	7.8	41	158	
" "	" "	" 29	199	4.0	12.2	93.2	2.8	930	7.8	10	180	
" "	" "	" 31	81	6.0	12.2	97.4	4.3	240	7.8	10	177	
Harpeth Creek - 1 mile Below Dickson, Tenn.	CHrT 177	Jan. 23	1	9.0	7.1	61.3	32.6	46,000	7.0	45	139	105
" "	" "	" 2[illegible]	4	8.0	9.5	80.4	7.4	24,000	7.2	10	80	
" "	" "	" 29	2	7.0	9.3	76.7	12.6	24,000	7.1	10	90	
" "	" "	" 31	2	8.0	9.0	75.5	7.4	930	7.2	10	100	
Cumberland River - Abv. Clarksville, Tenn.	C 127	1960 Nov. 8	1,180	11.5	7.9	72.4	2.3	••	6.9	10	70	78
" "	" "	" 13	5,290	6.0	8.4	67.0	2.2	110	7.1	140	74	
" "	" "	" 15	2,590	0.0	8.1	55.4	2.9	39	7.2	40	80	
Cumberland River - Bel. Clarksville, Tennessee	C 126	Nov. 8	1,180	10.5	8.1	72.2	1.9	9	6.9	10	70	78
" "	" "	" 13	5,290	9.5	8.3	72.3	2.4	150	7.1	160	70	
" "	" "	" 15	2,590	0.0	9.3	63.6	1.9	43	7.3	35	78	

TABLE C-7 CUMBERLAND RIVER BASIN

OHIO RIVER POLLUTION SURVEY
LABORATORY DATA

SUMMARY OF INDIVIDUAL RESULTS

Sampling Point	Mileage From Mouth	Date 1940	Average Discharge c.f.s.	Temp. °C	Dissolved Oxygen p.p.m.	Dissolved Oxygen % Sat.	5 Day B.O.D. p.p.m.	Coliforms M.P.N. Per ml	pH	Turbidity p.p.m.	Alkalinity p.p.m.	Hardness p.p.m.
Red River - near Adams South of Guthrie	CR 148	Nov. 8	69	3.5	10.1	76.0	1.2	4	7.8	10	[illegible]	130
" "	" "	" 13	429	2.5	10.1	74.2	1.3	110	7.3	130	118	
" "	" "	" 15	167	0.0	12.0	82.1	1.9	93	7.5	95	122	
Sulphur Creek - Above Springfield, Tennessee	CRSu 163	Nov. 8	8	4.0	9.2	70.1	1.9	4	7.5	10	128	134
" "	" "	" 13	22	5.0	10.4	81.3	1.9	93	7.3	90	106	
" "	" "	" 15	12	0.0	12.5	85.7	1.7	15	7.5	20	134	
Sulphur Creek - Below Springfield, Tennessee	CRSu 161	Nov. 8	8	3.5	7.2	54.1	8.2	4,400	7.5	10	146	136
" "	" "	" 13	22	1.5	9.1	65.1	3.6	910	7.4	100	98	
" "	" "	" 15	12	0.0	11.2	76.7	5.2	1,500	7.3	20	118	
Spring Creek - Below Guthrie, Kentucky	CRWfSp 139	Nov. 8	2	4.5	7.1	54.9	4.2	23	6.9	10	82	222
" "	" "	" 13	1	6.0	9.9	79.0	6.9	23	6.5	5	26	
" "	" "	" 15	2	1.0	11.6	81.5	9.3	9	7.1	15	62	
Red River - Abv. mouth Clarksville, Tennessee	CR 126	Nov. 8	148	10.5	8.8	78.8	1.2	1	7.7	10	158	146
" "	" "	" 13	554	5.0	9.4	73.8	1.7	110	7.3	210	118	
" "	" "	" 15	256	1.0	10.8	75.5	1.1	150	7.5	110	76	
Cumberland River - Br. Canton, Kentucky	C 63	Nov. 12	7,360	4.5	9.7	74.6	0.8	43	7.5	40	84	
" "	" "	" 14	2,370	2.5	10.4	76.2	1.4	9	7.3	10	88	
" "	" "	" 18	2,260	1.5	10.5	74.8	1.3	4	7.3	20	76	82
N. Fork Little River Above Hopkinsville, Ky.	CLrNf 107	Nov. 12	2	5.0	4.0	31.3	3.9	240	6.9	430	74	
" "	" "	" 14	1	3.5	2.9	21.7	10.4	460	6.9	410	44	
" "	" "	" 18	1	6.0	4.1	32.8	3.4	9	6.6	360	42	50
N. Fork Little River Below Hopkinsville, Ky.	CLrNf 104	Nov. 12	4	4.5	6.7	51.7	3.9	230	7.3	35	102	
" "	" "	" 14	2	2.5	8.2	60.0	4.0	230	7.3	10	130	
" "	" "	" 18	1	2.5	7.8	57.1	3.6	430	7.4	23	134	138
S. Fork Little River Hopkinsville, Kentucky	CLrSf 104	Nov. 12	1	--	1.6	--	12.5	930	7.5	25	276	
" "	" "	" 14	1	2.0	2.2	16.0	19.4	930	7.3	30	292	
" "	" "	" 18	1	5.0	0.9	7.1	9.6	930	7.5	25	296	172
Little River—4½ miles Below Hopkinsville, Ky.	CLr 98	Nov. 12	14	7.5	6.1	50.9	6.2	1,100	7.3	250	82	
" "	" "	" 14	4	2.5	7.6	55.8	2.6	23	7.2	50	124	
" "	" "	" 18	3	3.0	9.8	72.8	1.8	9	7.5	15	148	132
Little River - Above Cadiz, Kentucky	CLr 72	Nov. 12	186	4.0	7.6	57.7	1.6	240	7.6	170	142	
" "	" "	" 14	34	3.5	8.3	62.4	3.0	460	7.3	150	120	
" "	" "	" 18	28	3.0	10.0	74.2	2.6	20	7.4	40	140	118
Little River - Below Cadiz, Kentucky	CLr 71	Nov. 12	186	4.5	9.3	71.9	1.7	240	7.7	240	134	
" "	" "	" 14	34	3.5	9.4	71.1	2.7	240	7.4	130	132	
" "	" "	" 18	30	5.0	11.3	88.4	2.2	23	7.4	70	138	114

TABLE C-7 CUMBERLAND RIVER BASIN

OHIO RIVER POLLUTION SURVEY
LABORATORY DATA

SUMMARY OF INDIVIDUAL RESULTS

Sampling Point	Mileage From Mouth	Date 1940	Average Discharge c.f.s.	Temp. °C	Dissolved Oxygen p.p.m.	Dissolved Oxygen % Sat.	5 Day B.O.D. p.p.m.	Coliforms M.P.N. Per ml	pH	Turbidity p.p.m.	Alkalinity p.p.m.	Hardness p.p.m.
Spring - Eddy Creek Above Princeton, Ky.	CE1Sp 65	Oct. 29	1	19.0	8.4	89.8	0.6	2	6.8	5	200	170
" "	" "	Nov. 1	1	16.0	8.5	85.3	1.0	2	7.8	5	226	
" "	" "	" 6	1	9.5	8.6	75.1	0.6	2	6.8	5	196	
Eddy Creek - Below Princeton, Kentucky	CE1 63	Oct. 29	1	18.5	0.0	00.0	187.	240,000	6.9	95	250	174
" "	" "	Nov. 1	2	16.0	1.6	15.7	35.3	23,000	7.9	140	88	
" "	" "	" 6	1	8.5	6.0	51.2	17.1	360	7.1	18	164	
Cumberland River Eddyville Ferry	C 44	Oct. 29	830	19.5	9.4	101.5	1.7	8	7.7	15	78	72
" "	" "	Nov. 1	1,150	16.5	8.4	85.2	1.1	2	7.5	10	82	
" "	" "	" 6	2,370	10.0	9.4	83.0	1.5	**	7.6	15	74	
Cumberland River Kuttawa Ferry	C 41	Oct. 29	830	20.0	8.9	97.1	1.9	46	7.7	15	80	80
" "	" "	Nov. 1	1,150	18.0	8.6	90.3	1.6	21	7.5	13	82	
" "	" "	" 6	2,370	9.5	9.8	85.5	1.9	4	7.6	20	72	
Cumberland River At Mouth	C 2.8	Sept. 20	1,990	24.5	7.6	90.2	1.2	1	7.7	18	77	82
" "	" "	" 25	910	21.0	7.1	78.9	1.9	1	7.7	28	76	
" "	" "	" 26	1,020	20.5	7.5	82.4	1.5	5	7.7	20	77	
" "	" "	Oct. 1	2,200	21.0	8.8	97.9	1.4	**	7.9	30	83	
" "	" "	Nov. 14	3,760	10.0	9.9	87.1	1.4	9	7.3	45	87	
" "	" "	" 15	2,250	8.0	9.4	79.6	1.0	2	7.5	41	88	96
" "	" "	" 16	1,880	7.5	9.8	81.5	1.2	8	7.3	25	90	
" "	" "	" 18	2,710	10.0	10.5	92.7	1.3	2	7.5	18	92	
" "	" "	1941 Mar. 1	4,750	5.0	12.9	100.6	1.8	2	7.6	25	90	
" "	" "	" 4	8,800	6.0	12.9	103.6	1.5	1	7.6	20	83	112
" "	" "	" 5	8,040	6.0	13.0	104.6	1.1	**	7.7	20	86	

** Less than one.

GREEN RIVER BASIN

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GREEN RIVER BASIN*

Syllabus and Conclusions

Syllabus

The Green River drains 9,220 square miles of rolling and hilly land largely in west central Kentucky but extending to northern Tennessee. Although predominantly an agricultural area, coal is mined extensively in the western part of the basin. About 10 percent of the total population of 440,000 is urban. Sewage from nearly 75 percent of the sewered population is treated and there are no industrial wastes of importance. Acid mine drainage damages a number of the small tributaries but has no noticeable effect on the larger streams. Pollution problems are local in character and abatement can be effected by known methods of treatment.

Conclusions

(1) Nine of the 39 public water supplies are taken from streams below sources of pollution but none of the supplies is seriously polluted.

(2) Of the 45,000 sewered population, the sewage from 34,300 is treated. Industrial wastes from 13 small plants have a total population equivalent of 3,800.

(3) Laboratory data show the larger streams of the basin to be in good sanitary condition, and many of the small streams to be grossly polluted by untreated or inadequately treated sewage. Acid mine drainage was found in only one stream during the laboratory survey.

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* For maps of this Basin, see Cumberland River Basin.

(4) The minimum monthly mean summer flows of record on the Green River at Lock #6 and the Barren River at Lock #1 are 230 c.f.s. and 162 c.f.s. respectively.

(5) Proposed flood control reservoirs studied by the U. S. Engineer Department are so located as to be of little benefit to pollution abatement.

(6) Sewage, although receiving primary treatment, affects the smaller tributaries having extremely low flows. Secondary treatment seems justified at these places. Primary treatment should be adequate for towns on the main stream and on its larger tributaries.

(7) Most of the industrial wastes can be effectively treated at the municipal treatment plants.

(8) Estimated costs of the suggested pollution abatement program for the basin and of the work already done from Table Gr-1 are summarized below:

Treatment	Capital Cost	Annual Charges
Existing	$450,000	$55,000
Suggested Additional	780,000	80,000

Estimated additional costs, over existing charges, of programs involving uniform treatment throughout the basin are:

Primary, all places	$550,000	$50,000
Secondary, all places	960,000	100,000

Table Gr-1 Green River Basin - Estimated Cost of Existing and Suggested Minimum Corrective Measures for Sewage and Industrial Wastes, with Comparative Costs for Primary and Secondary Treatment.

	Number of Plants		Population Connected to Sewers	Capital Investment (Dollars)	Annual Charges (Dollars)		
	Prim.	Sec.			Amort. & Interest	Operation & Main.	Total
Existing Sewage Treatment	8	3	34,300	450,000	30,000	25,000	55,000
Suggested Minimum Correction							
Sewage Treatment Plants	9	7	10,900	600,000	40,000	30,000	70,000
Required Interceptors			-	180,000	10,000	-	10,000
Independent Industrial Waste Correction	-		-	-	-	-	-
Total				780,000	50,000	30,000	80,000
Comparative Cost							
Primary Treatment all Waste				550,000	34,000	16,000	50,000
Secondary Treatment all Waste				960,000	64,000	36,000	100,000
As Suggested				780,000	50,000	30,000	80,000

Description

The Green River drains an area of 9,220 square miles in west central Kentucky. About 380 square miles of the basin are in Tennessee. Larger tributaries are:

Tributaries	Distance above Mouth of Green River	Drainage Area Square Miles
Pond River	55	756
Rough River	71	1,025
Mud River	109	430
Barren River	150	2,132
Nolin River	184	750

Populations of urban communities and of the basin as a whole, for the past 30 years, are tabulated below.

Urban Communities	Populations			
	1910	1920	1930	1940
Bowling Green	9,173	9,638	12,438	14,585
Madisonville	4,966	5,030	6,908	8,209
Glasgow	2,316	2,559	5,042	5,815
Central City	2,545	3,108	4,321	4,199
Russellville	3,111	3,124	3,297	3,983
Franklin	3,063	3,154	3,056	3,940
Elizabethtown	1,970	2,530	2,590	3,667
Entire Basin				
Rural	401,233	398,307	377,209	399,994
Urban	22,858	29,143	37,652	44,398
Total	424,091	427,450	414,861	444,392

None of the urban communities and only about 8 percent of the rural population is in the Tennessee portion of the basin.

Agriculture is the principal occupation, although a large part of the area is too hilly for cultivation. Coal is mined extensively in the western part of the basin. Cavernous limestone underlies much of the region and considerable areas have no well defined watercourses. Drainage collects in shallow depressions and "sinks" and is either evaporated or disappears into the limestone caves. Mammoth Cave is in this basin.

Water Uses - Six locks and dams on the Green River and one each on the Barren and Rough Rivers, provide a 4 to 5½ ft. navigation channel as far as Mammoth Cave on the Green River, Bowling Green on the Barren and Hartford on the Rough. Less than 200,000 tons of freight are carried annually, the principal commodity being asphalt. The Green and most of its tributaries are considered good fishing streams and are extensively used for recreation by local residents.

Table Gr-2 Green River Basin - Surface Water Supplies

Supply	Source	Mile (1)	Treatment (2)	Population Served	Cons. M.G.D.
Supplies Below Community Sewer Outfalls					
Calhoun	Green River	63.4	D	600	0.04
Livermore	" "	71.3	FD	1,200	0.06
Central City	" "	86	FD	3,800	0.36
Rockport	" "	95.0	FD	400	0.01
Morgantown	" "	143.3	CD	800	0.06
Brownsville	" "	180.5	None	300	0.02
Munfordville	" "	213	SD	500	0.02
Greensburg	" "	260	FD	800	0.04
Bowling Green	Barren River	187	FD	15,000	1.20
Other Surface Supplies					
Hartford	Rough River	101	FD	1,200	0.07
Franklin	Drakes Cr. (Imp.)	230	FD	3,300	0.20
Glasgow	Beaver Creek	250	FD	4,000	0.21
Tompkinsville	Mill Cr. (Imp.)	270	FD	600	0.04
Hodgenville	N.Fk. Nolin River (Impounded)	269	FD	1,200	0.06
Campbellsville	Pittman Cr. (Imp.)	270	FD	2,600	0.09
Columbia	Russell Creek	295	FD	1,000	0.04
Liberty	Green River	326	FD	600	0.02
Madisonville	Impounded	-	FD	8,500	0.50
Mortons Gap	"	-	FD	500	0.01
Graham	Impounded	-	D	1,000	0.02
Greenville	"	-	FD	2,400	0.10
Total - Below Sewer Outfalls				23,400	1.81
Other				26,900	1.36
Total - Surface Water Supplies				50,300	3.17

(1) Miles above mouth of Green River.
(2) F - Coagulated, settled, filtered, C - Coagulated, settled, S - Settled, D - Chlorinated.

FIG. Gr - 2

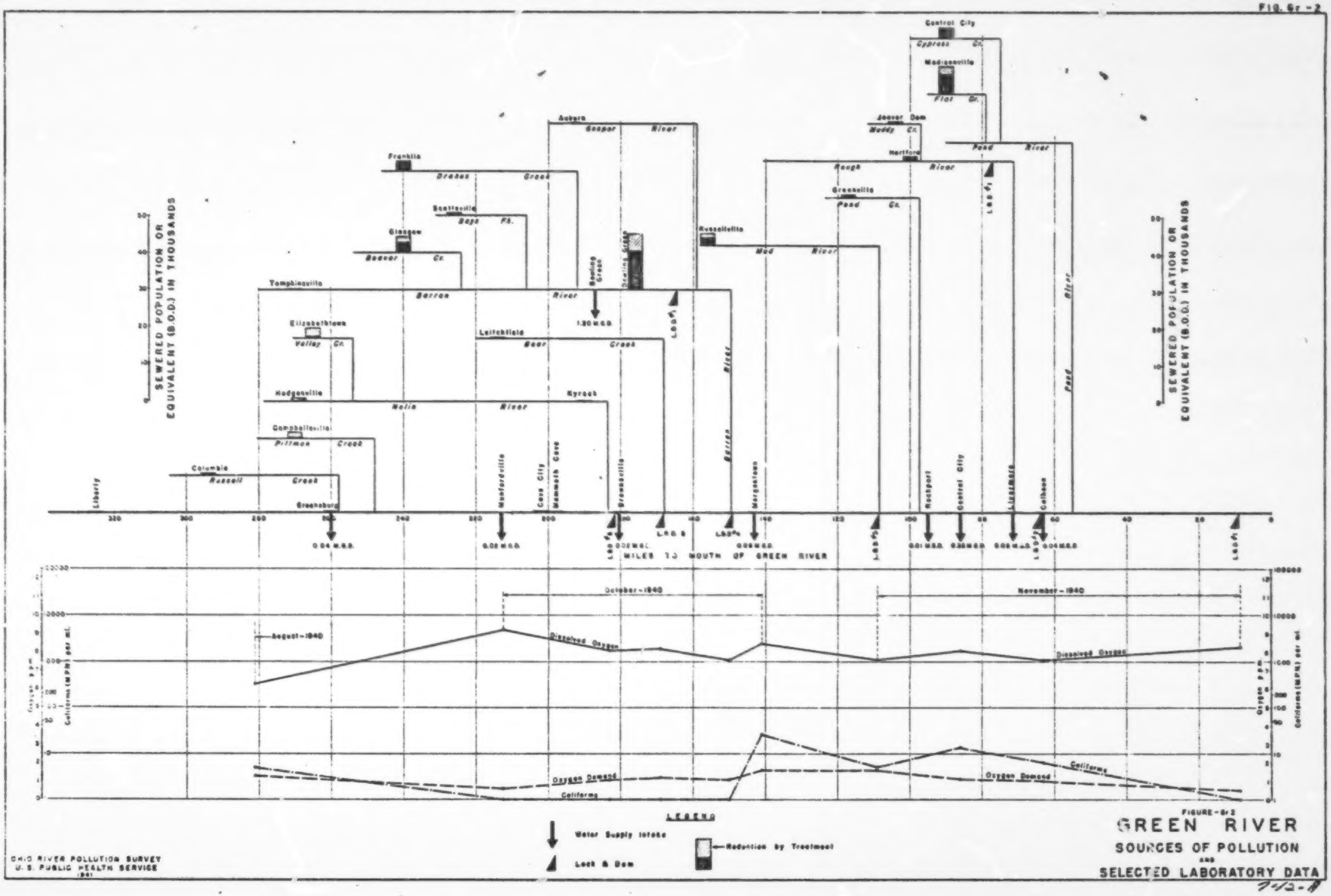

FIGURE - Gr 2

GREEN RIVER

SOURCES OF POLLUTION AND SELECTED LABORATORY DATA

OHIO RIVER POLLUTION SURVEY
U. S. PUBLIC HEALTH SERVICE
1941

7-12-A

Table Gr-3 Green River Basin - Sources of Pollution Including Industrial Wastes, Expressed as Sewered Population Equivalent (B.O.D.)

Municipality	Stream	Miles Above Mouth of Green River	Population Connected to Sewers	Treatment	Sewered Population Equivalent (B.O.D.) Untreated	Sewered Population Equivalent (B.O.D.) Discharged
Central City	Cypress Creek	90	3,000	None	3,000	3,000
Madisonville	Flat Creek	90	7,600	Primary	7,700	5,000
Beaver Dam	Muddy Creek	104	600	"	600	400
Hartford	Rough River	100	1,100	None	1,300	1,300
Greenville	Pond Creek	117	900	"	900	900
Russellville	Town Branch	157	3,000	Primary	3,200	2,100
Bowling Green	Barren River	176	13,000	"	15,200	10,600
Franklin	Drakes Creek	230	2,600	" (1)	2,600	2,600
Scottsville	South Bays Fork	226	600	"	600	400
Glasgow	So. Fk. Beaver Creek	250	3,900	"	4,400	2,900
Elizabethtown	Valley Creek	261	2,600	Secondary	2,800	400
Hodgenville	No. Fk. Nol'n River	269	900	"	900	100
Cave City	Sinkholes	200	500	None	500	500
Campbellsville	Buckhorn Creek	270	1,500	Secondary	1,700	300
Columbia	Russell Creek	294	600	None	600	600
11 Smaller Sources		-	2,600	(2)	2,800	2,700
Total			45,000	-	48,800	33,800

(1) One small Imhoff Tank receives about 8 percent of sewage.
(2) One primary plant. No treatment at 10 other places.

Presentation of Field Data

Figure C-1 shows the location and magnitude of each source of pollution of consequence in the basin. Figure Gr-2 shows similar data and, in addition, the location of water intakes from streams below sources of pollution and laboratory data on coliform organisms, dissolved oxygen and B.O.D.

Public Water Supplies - Of the thirty-nine public water supplies in the basin, 21 are from surface sources and 18 are from wells and springs. About 20,000 people use underground supplies and 50,000 use surface supplies. Table Gr-2 shows data on the surface water supplies of the basin.

Sewerage - Table Gr-3 shows the sewered population at each of the more important sources of pollution in the basin, all in Kentucky. Sewage from 34,300 persons, of the 45,000 to whom sewerage is available, is treated; that from 29,300 by primary and that from 5,000 in secondary treatment works.

Industrial Wastes - Thirteen small plants in the basin discharge wastes of significance. Wastes from seven of these are treated at municipal sewage treatment plants. Table Gr-4 shows data on the remaining six plants, four of which discharge wastes to caverns.

Table Gr-4 Green River Basin - Summary of Industrial Wastes not Discharged to Municipal Treatment Plants with Total of Entire Industrial Waste Load in the Basin.

Industry	Number of Plants	Industrial Waste Disposal		At Least Minor Corrective Measures Taken	Estimated Sewered Population Equivalent (B.O.D.)
		Munic. Sewers	Private Outlet		
Milk	2	0	2	2	400
Meat	3	0	3	3	1,800
Miscellaneous	1	0	1	-	200
Waste Unconnected Munic. Treatment	6	0	6	5	2,400
Waste Connected to Municipal Treatment					1,400
Total Industrial Waste in Basin					3,800

Acid Mine Drainage - Prior to the mine sealing program some 76,500 tons of acid entered the streams each year from the coal mines in the western part of the basin. This has been reduced by about 20 percent by sealing some of the largest acid producing mines. A considerable amount of work remains to be done. The relatively high natural alkalinity of the normal stream waters tends to localize the effects of mine acid discharges.

Presentation of Laboratory Data

The laboratory survey of this basin, especially the lower section, was made during a very dry season. Below sewer outlets on small tributaries, sewage comprised from 65 to 75 percent of the total stream flow. Because of ponding, seepage and evaporation streams were usually dry a few miles below town. Observations were made during August, October and November 1940 and February 1941 by trailer units.

General summaries of Green River data are shown in Table Gr-7 and selected data are tabulated in Table Gr-5. Figures C-3, C-4 and C-5 show the results of the coliform, dissolved oxygen and biochemical oxygen demand determinations at the various sampling points in diagramatic form. The averages are from three samples collected during a period of less than a month, except at the mouth, where they indicate the most unfavorable monthly average obtained during three months.

Laboratory data show no particular pollution problem on the Green River itself, there being no communities of consequence discharging sewage into the main stream. The major pollution problems result from local nuisances below towns on the smaller streams with the worst conditions prevailing below Beaver Dam, Central City, Elizabethtown, Franklin, Glasgow, Madisonville, Russellville and Scottsville.

Pond River drains a large coal mining area but at the time of the survey mines were mostly shut down and those working were pumping mine water intermittently. With low flows and ponding, wastes were not reaching the streams except at Nortonville where acid stream conditions were observed on Drakes Creek.

Biological Summary - The plankton population of the Green is extremely low, usually less than 2,000 p.p.m. These low values are due to the fact that the stream flows through a region of poor soil, low in organic matter, and there are no important sources of pollution along the stream.

Table Gr-5 Green River Basin - Selected Laboratory Data

River Location	Green River			Buckhorn Cr. below Campbellsville	Nolin R. below Hodgenville	Valley Cr. below Elizabethton	S. Beaver Creek below Glasgow
	below Munfordville	at Lock #3	at Spottsville				
River Miles Above:							
Conf. with Green	-	-	-	20	83.5	80	90.5
Mouth of Green	212.5	103	8.6	268	267	263.5	240
Period - 1940	Oct.	Oct.-Nov.	Oct.	Aug.	Aug.	Aug.	Oct.
Number of Samples	3	3	2	3	3	3	3
Flow in c.f.s.:							
Sampling Days	103	737	-	*	1	3	1
Minimum Month	108	-	558	-	-	-	-
Water Temperature °C.	13.2	9.5	17.5	22.2	21.8	21.8	13.5
Coliforms per ml.	1	5	1	1,680	210	1,190	467,000
Dissolved oxygen ppm.	9.2	7.6	8.3	5.4	5.0	2.1	3.1
B.O.D., 5-day, p.p.m.	0.6	1.6	0.5	8.7	3.0	8.0	313

River Location	Bays Fork below Scottsville	Town Br. below Franklin	Muddy Cr. below Beaver Dam	Barren River		Flat Cr. below Madisonville	Cypress Cr. below Central City
				above Bowling Green	below Bowling Green		
River Miles Above:							
Conf. with Green	74.5	80.5	33	38	26.5	25	27
Mouth of Green	224	228	104	137.5	176	80	82
Period - 1940	Oct.	Oct.	Oct.	Oct.	Oct.	Oct.-Nov.	Oct.-Nov.
Number of Samples	3	3	3	3	3	3	3
Flow in c.f.s.:							
Sampling Days	*	*	*	95	97	1	*
Water Temperature °C.	13.2	9.8	10.2	15.7	18.7	19.2	10.8
Coliforms per ml.	9,300	32,000	300,000	15	1,340	412,000	42,000
Dissolved oxygen ppm.	7.3	0.0	0.0	8.6	8.1	1.4	0.5
B.O.D., 5-day, p.p.m.	8.3	141	192	1.4	2.3	266	21.2

* Less than one.

Hydrometric Data

Eleven stream gaging stations have been maintained in the Green Basin at various times, six of which are currently in operation. Table Gr-6 shows mean monthly flows at representative stations during some low-flow years.

Table Gr-6 Green River Basin - Monthly Mean Summer Flows for Years in Which Low Summer Flows have Occurred.

		Green R. Munfordville, Ky.	Green R. Livermore, Ky.	Rough R. Dundee, Ky.	Barren R. Greencastle, Ky.
River Miles Above:					
Conf. with Green		-	-	57	15
Mouth of Green		213	70	128	164
Drain. Area Sq. Mi.		1,790	7,580	764	1,950
Period of Record		1915-22, 1927-40	1930-40	1930-40	1925-31
Year		1930	1930	1931	1930
June	c.f.s.	226	1,160	27	563
July	"	182	706	67	368
August	"	108	482	280	178
September	"	200	524	155	162
Year		1939	1939	1935	1925
June	"	1,692	7,778	1,790	534
July	"	1,000	3,183	670	401
August	"	810	2,438	150	166
September	"	143	530	28	162
Year		1919	1940	1936	1927
June	"	1,100	2,480	28	3,470
July	"	437	1,597	64	902
August	"	398	1,210	31	675
September	"	147	740	205	251

Low-flow Regulation - Sites for possible flood control reservoirs in the basin have been studied by the U. S. Engineer Department in connection with the authorized program for flood control on the Ohio River and its tributaries. These reservoirs would be located on the Green, Barren, Rough and Nolin Rivers. The largest, on the Green River below the mouth of Mud River, would have a capacity in excess of 3,000,000 acre-feet. Consideration has been given to the operation of the proposed reservoirs to augment stream flows during the summer months.

Discussion

Of the 15 sources of pollution listed in Table Gr-3, none is on the Green River itself and two, Bowling Green and Hartford, are on tributary streams with an appreciable reliable flow during the summer. As noted in the discussion of the laboratory studies, most of the receiving streams contained a high percentage of sewage. Secondary treatment appears justified at places such as Madisonville, Russellville, Glasgow, Central City and Franklin. At Bowling Green and Hartford and at the communities along the Green River primary treatment combined with dilution should be sufficient to maintain satisfactory stream conditions. At Cave City where there are no surface streams and all wastes enter the caverns beneath the town, primary treatment and continuous chlorination should be adequate to prevent pollution of the underground water. Industrial wastes present no particular problems. All of the plants are small and the wastes can be treated at municipal treatment plants with the sewage.

Further reductions in the acidity of the streams in the western part of the basin can be effected by a renewal of the mine sealing program. A large part of the acid load comes from active mines.

Low-flow augmentation by the proposed flood control reservoirs would be beneficial but would have no tangible monetary value to pollution abatement, since primary treatment will be sufficient for wastes discharged to the streams which might be affected by the increased flows.

The estimated cost of the suggested pollution abatement program and of programs for primary and for secondary treatment of all wastes is shown in Table Gr-1.

TABLE Gr-7 GREEN RIVER BASIN

OHIO RIVER POLLUTION SURVEY
LABORATORY DATA

SUMMARY OF INDIVIDUAL RESULTS

Sampling Point	Mileage From Mouth		Date 1940	Average Discharge c.f.s.	Temp. °C	Dissolved Oxygen p.p.m.	Dissolved Oxygen % Sat.	5 Day B.O.D. p.p.m.	Coliform M.P.N. Per ml	pH	Turbidity p.p.m.	Alkalinity p.p.m.	Hardness p.p.m.
Green River-Bridge on Rt.55-Campbellsville,Ky.	Gr	281	Aug. 14	41	25.5	6.2	74.3	1.5	8	7.4	45	64	64
" "	"	"	" 19	18	23.5	5.6	65.5	0.9	2	7.4	40	64	
" "	"	"	" 21	14	21.0	7.1	79.0	1.5	4	7.6	40	62	
Russell Creek Water plant intake Columbia, Ky.	GrR	296	Aug. 14	6	26.0	6.5	78.6	2.5	4	7.5	10	94	88
" "	"	"	" 19	4	23.5	5.6	65.3	2.3	4	7.5	30	90	
" "	"	"	" 21	4	21.0	7.3	81.3	2.2	4	7.6	25	78	
Russell Creek Below Septic Tank Columbia, Ky.	GrR	290	Aug. 14	6	27.0	7.0	86.6	3.3	390	7.5	10	96	86
" "	"	"	" 19	6	24.0	6.1	71.0	2.0	930	7.4	35	98	
" "	"	"	" 21	6	21.0	7.6	84.6	2.1	1,500	7.6	30	94	
S.Fk. Pittman Creek abv. Campbellsville, Ky.	GrP	270	Aug. 14	**	25.5	7.2	86.6	3.0	46	7.7	30	90	78
" "	"	"	" 19	**	23.5	6.7	77.7	1.9	43	7.7	10	88	
" "	"	"	" 21	**	20.0	7.2	79.1	2.1	7	7.7	5	88	
Buckhorn Creek - Below Campbellsville, Ky.	GrPB	268	Aug. 14	**	24.5	3.9	46.4	11.7	4,600	7.5	5	170	200
" "	"	"	" 19	**	22.5	5.4	61.9	5.2	360	7.7	5	162	
" "	"	"	" 21	**	19.5	6.8	72.9	9.1	93	7.7	10	164	
Green River - Below Munfordville, Ky.	Gr	212.5	Oct. 8	110	11.5	8.8	80.3	0.6	2	7.7	8	120	106
" "	"	"	" 14	103	15.5	9.3	92.5	0.5	**	7.7	10	132	
" "	"	"	" 18	100	13.0	9.5	89.6	0.8	1	7.7	8	128	
N.Fk.Nolin River-Above Hodgenville, Ky.	GrNNF	272	Aug. 12	4	27.5	3.8	47.1	2.0	23	7.4	225	92	110
" "	"	"	" 15	**	22.5	3.6	41.5	2.1	24	7.4	75	116	
" "	"	"	" 22	**	17.0	4.2	43.3	0.9	8	7.6	75	138	
N.Fk.Nolin River-Below Hodgenville, Ky.	GrNNF	267	Aug. 12	4	26.0	4.7	57.2	4.4	240	7.2	320	80	128
" "	"	"	" 15	**	22.5	4.9	56.5	2.5	150	7.4	75	108	
" "	"	"	" 22	**	17.0	5.5	56.6	2.0	240	7.5	40	140	
Valley Creek - Above Elizabethtown, Ky.	GrNV	267	Aug. 12	1	27.5	3.5	43.8	12.1	930	7.2	15	150	88
" "	"	"	" 15	**	23.0	0.0	00.0	11.5	430	7.1	40	158	
" "	"	"	" 22	**	17.5	2.9	30.1	9.1	4,600	7.5	15	164	
Valley Creek - Below Elizabethtown, Ky.	GrNV	263.5	Aug. 12	4	26.0	1.5	18.2	9.5	240	7.4	5	192	164
" "	"	"	" 15	2	22.0	3.4	38.7	11.2	2,400	7.3	25	176	
" "	"	"	" 22	2	17.5	1.3	13.7	3.3	930	7.5	100	178	
Nolin River - Below Kyrock, Kentucky	GrN	196.5	Oct. 8	75	12.0	8.3	77.0	1.1	4	7.9	13	130	128
" "	"	"	" 14	72	17.5	8.8	91.6	0.5	1	7.8	8	134	
" "	"	"	" 18	66	13.0	9.1	85.9	0.8	2	7.7	10	134	
Green River - Above Lock & Dam #6	Gr	150	Oct. 8	210	15.0	7.6	74.9	1.1	2	7.7	8	120	118
" "	"	"	" 14	195	16.0	8.2	82.8	1.1	**	7.7	5	130	
" "	"	"	" 18	180	11.0	8.3	75.2	1.2	**	7.7	5	130	

TABLE Gr-7 GREEN RIVER BASIN

OHIO RIVER POLLUTION SURVEY
LABORATORY DATA

SUMMARY OF INDIVIDUAL RESULTS

Sampling Point	Mileage From Mouth		Date 1960		Average Discharge c.f.s.	Temp. °C	Dissolved Oxygen p.p.m.	Dissolved Oxygen % Sat.	5 Day B.O.D. p.p.m.	Coliform M.P.N. Per ml	pH	Turbidity p.p.m.	Alkalinity p.p.m.	Hardness p.p.m.
Green River - Above Lock & Dam #5	Gr	169	Oct.	8	210	18.5	7.9	83.3	1.1	**	7.7	8	117	108
" "	"	"	"	14	195	21.5	8.1	91.1	1.0	1	7.7	5	122	
" "	"	"	"	18	180	17.5	8.8	90.8	1.4	**	7.8	5	116	
Bear Creek At Mouth	GrBr	169	Oct.	8	**	18.5	7.7	82.0	1.1	2	7.7	5	114	114
"	"	"	"	14	**	22.0	7.9	89.8	0.9	1	7.7	10	118	
"	"	"	"	18	**	17.5	8.6	89.6	1.4	4	7.8	5	126	
Green River - Above Lock & Dam No. 4	Gr	150	Oct.	9	250	16.0	7.3	73.2	1.4	2	7.6	10	102	94
" "	"	"	"	15	230	14.0	7.6	72.8	0.9	1	7.6	15	102	
" "	"	"	"	21	200	12.5	7.9	73.8	1.1	1	7.7	13	118	
Beaver Creek - Above Glasgow, Ky.	GrBBe	252	Oct.	7	4	17.0	7.4	76.0	1.2	9	7.8	13	164	142
" "	"	"	"	11	4	14.0	7.9	76.2	1.6	4	7.7	20	176	
" "	"	"	"	17	5	11.0	7.1	64.4	2.0	46	7.6	20	170	
S.Fk.Beaver Creek Below Glasgow, Ky.	GrBBeS	240	Oct.	7	2	16.5	3.0	30.5	103	240,000	7.0	130	130	120
" "	"	"	"	11	**	14.5	0.0	00.0	633	930,000	7.1	375	258	
" "	"	"	"	17	**	9.5	3.3	28.5	202	230,000	7.5	190	228	
Barren River - Bridge at Route 31E Scottsville, Ky.	GrB	220	Oct.	10	64	15.0	8.3	81.9	1.3	2	7.7	10	84	96
" "	"	"	"	16	64	12.5	7.5	69.9	0.1	2	7.6	13	104	
" "	"	"	"	22	59	14.0	8.8	84.8	1.1	1	7.6	10	100	
Bays Fork - Below Scottsville, Ky.	GrBBF	224	Oct.	10	**	14.0	7.7	74.1	6.0	11,000	7.5	5	186	164
" "	"	"	"	16	**	12.5	7.1	66.1	10.3	15,000	7.5	15	202	
" "	"	"	"	22	**	13.5	7.2	68.2	8.6	2,300	7.4	8	186	
Drake Creek - Above Franklin, Ky.	GrBDWF	231	Oct.	10	5	12.0	8.3	76.5	2.8	24	7.6	8	148	142
" "	"	"	"	16	4	11.0	7.2	65.0	1.6	39	7.7	10	162	
" "	"	"	"	22	5	12.0	8.6	79.2	1.5	4	7.6	10	142	
Town Branch - Below Franklin, Ky.	GrBDWF	228	Oct.	10	**	11.0	0.0	00.0	196	24,000	6.9	60	222	136
" "	"	"	"	16	**	9.0	0.0	00.0	101	93,000	6.9	70	250	
" "	"	"	"	22	**	9.5	0.0	00.0	125	9,100	6.8	75	224	
Town Branch - mouth Below Franklin, Ky.	GrBDWF	226	Oct.	10	6	11.0	7.6	68.8	2.0	43	7.7	5	170	136
" "	"	"	"	16	5	6.5			2.5	240	7.7	8	146	
" "	"	"	"	22	6	9.5	8.3	72.4	1.7	4	7.6	8	164	
Drake Creek - Mouth Bowling Green, Ky.	GrBD	193	Oct.	10	24	17.5	8.0	82.9	1.4	**	7.7	8	144	132
" "	"	"	"	16	24	14.0	7.5	72.7	0.3	1	7.7	10	142	
" "	"	"	"	22	25	18.5	8.8	93.4	1.9	2	7.6	5	144	
Barren River - Above Bowling Green, Ky.	GrB	187.5	Oct.	7	96	16.0	8.5	85.3	1.4	4	7.7	10	120	122
" "	"	"	"	11	97	17.5	8.8	91.6	1.2	39	7.7	10	126	
" "	"	"	"	17	93	13.5	8.4	80.1	1.5	2	7.7	7	120	

TABLE Gr-7 GREEN RIVER BASIN

OHIO RIVER POLLUTION SURVEY
LABORATORY DATA

SUMMARY OF INDIVIDUAL RESULTS

Sampling Point	Mileage From Mouth		Date 1950	Average Discharge c.f.s.	Temp. °C	Dissolved Oxygen p.p.m.	Dissolved Oxygen % Sat.	5 Day B.O.D. p.p.m.	Coliform M.P.N. Per ml	pH	Turbidity p.p.m.	Alkalinity p.p.m.	Hardness p.p.m.
Pet Milk Plant Effluent Bowling Green, Ky.	Gr3	178	Oct. 7	1	17.0	2.3	23.4	97.2	2,400	7.1	110	106	130
" "	"	"	" 11	1	20.0	1.8	19.6	89.8	2,300	7.1	75	132	
" "	"	"	" 17	1	17.0	2.0	20.5	59.1	930	7.5	70	154	
Barren River - Below Bowling Green, Ky.	Gr3	176	Oct. 7	98	18.5	8.4	88.8	2.2	2,100	7.6	10	128	122
" "	"	"	" 11	99	20.0	8.2	89.1	2.6	1,500	7.6	10	162	
" "	"	"	" 17	95	17.5	7.7	79.9	2.1	430	7.7	7	132	
Barren River - Above Lock & Dam #1	Gr3	165	Oct. 8	100	17.0	6.8	69.6	1.8	1	7.6	10	116	120
" "	"	"	" 14	100	24.0	8.3	97.4	1.1	2	7.7	10	126	
" "	"	"	" 18	100	18.0	7.8	81.6	2.0	**	7.7	95	112	
Gasper Creek - mouth Bowling Green, Ky.	Gr3G	199	Oct. 9	4	15.0	7.4	72.6	1.5	1	7.6	12	118	122
" "	"	"	" 15	4	16.0	7.7	77.5	1.3	2	7.7	20	122	
" "	"	"	" 21	3	15.5	8.4	83.8	1.8	1	7.7	8	126	
Barren River - mouth Woodbury, Kentucky	Gr3	150	Oct. 9	110	15.0	7.3	72.7	1.3	1	7.7	102	94	
" "	"	"	" 15	110	13.5	7.6	72.2	0.8	5	7.6	13	126	
" "	"	"	" 21	100	12.0	7.9	72.9	1.4	2	7.7	10	118	
Green River - Below Morgantown, Kentucky	Gr	141	Oct. 9	760	10.0	8.3	73.2	2.0	43	7.7	10	100	96
" "	"	"	" 15	340	15.5	8.2	81.7	1.0	23	7.5	5	98	
" "	"	"	" 21	300	11.5	9.0	81.8	1.8	9	7.7	5	110	
Mud River - Below Russellville, Ky.	GrM	156	Oct. 10	**	11.0	0.0	00.0	240	93,000	7.4	100	416	120
" "	"	"	" 16	**	10.0	0.0	00.0	161	93,000	7.1	110	408	
" "	"	"	" 22	**	9.0	0.0	00.0	158	93,000	7.1	270	402	
Mud River - mouth Rochester, Kentucky	GrM	110	Oct. 30		12.5	7.3	68.2	1.2	4	7.5	5	98	94
" "	"	"	Nov. 4	**	11.5	3.5	31.9	3.0	2	6.9	25	84	
" "	"	"	" 7	4	5.5	4.2	32.9	4.6	4	6.8	25	72	
Green River - Above Lock & Dam #3	Gr	109	Oct. 30	310	11.5	7.2	65.3	0.9	2	7.7	8	100	96
" "	"	"	Nov. 4	800	12.5	7.5	69.8	2.4	9	7.6	10	108	
" "	"	"	" 7	1,100	4.5	8.0	61.8	1.5	4	7.5	10	96	
Green River - Above Central City, Ky.	Gr	86	Oct. 30	320	14.5	7.9	77.4	0.8	9	7.7	8	102	102
" "	"	"	Nov. 4	850	13.0	8.0	75.7	1.4	4	7.6	8	108	
" "	"	"	" 7	1,180	8.0	8.3	70.1	1.1	24	7.5	15	84	
Rough River - Above Hartford, Kentucky	GrRo	102	Oct. 9	18	10.5	6.4	57.1	1.7	9	7.1	30	90	76
" "	"	"	" 15	20	16.0	5.9	59.3	1.3	8	7.3	35	104	
" "	"	"	" 21	10	9.5	6.0	52.4	2.6	4	7.3	15	126	
Rough River - Below Hartford, Kentucky	GrRo	99	Oct. 9	18	10.0	5.8	51.5	2.0	460	7.1	25	94	86
" "	"	"	" 15	20	13.0	5.5	52.0	1.3	1	7.3	45	102	
" "	"	"	" 21	10	8.0	5.3	44.6	2.7	460	7.3	20	124	

TABLE Gr-7 GREEN RIVER BASIN

OHIO RIVER POLLUTION SURVEY
LABORATORY DATA

SUMMARY OF INDIVIDUAL RESULTS

Sampling Point	Mileage From Mouth	Date 1940	Average Discharge c.f.s.	Temp. °C	Dissolved Oxygen p.p.m.	Dissolved Oxygen % Sat.	5 Day B.O.D. p.p.m.	Coliforms M.P.N. Per ml.	pH	Turbidity p.p.m.	Alkalinity p.p.m.	Hardness p.p.m.
Muddy Creek - Below Beaver Dam, Ky.	GrRoMu 104	Oct. 9	**	8.5	0.0	00.0	302	240,000	7.3	100	496	78
" "	" "	" 15	**	13.0	0.0	00.0	142	430,000	7.3	130	456	
" "	" "	" 21	**	9.0	0.0	00.0	132	230,000	7.4	110	46[illegible]	
Rough River - Above Lock & Dam #1	GrRo 79	Oct. 30	20	19.5	4.7	50.5	2.3	4	7.3	25	82	
" "	" "	Nov. 4	20	15.5	4.6	45.8	1.2	**	7.3	25	88	80
" "	" "	" 7	20	10.5	5.2	46.4	1.9	2	6.9	45	90	
Green River - Above Lock & Dam #2	Gr 63	Oct. 30	345	16.0	7.8	78.1	1.2	2	7.7	5	102	
" "	" "	Nov. 4	874	16.5	7.4	75.5	0.9	2	7.7	10	114	104
" "	" "	" 7	1,210	10.5	7.5	66.5	0.9	15	7.5	15	96	
Pond River - Bridge on Route #62 Nortonville, Ky.	GrPo 89	Oct. 29		20.0	5.0	54.3	3.6	23	6.7	8	26	120
" "	" "	Nov. 1	**	16.5	6.4	65.2	2.9	3	6.9	10	44	
" "	" "	" 6	**	9.0	5.3	45.6	1.8	2	6.9	8	38	
Drake Creek - Br. Rt.62 Nortonville, Ky.	GrPoD 87.8	Oct. 29	**	19.5	8.4	90.9	0.9* 1.9	11	3.5	5		880
" "	" "	Nov. 1	1	16.0	8.0	80.4	0.3* 3.7	1	3.5	8		
" "	" "	" 6	**	9.0	9.7	83.8	1.8* 3.0	**	3.1	5		
Flat Creek - Below Madisonville, Ky.	GrPoF 80	Oct. 28	1	24.0	0.0	00.0	443	93,000	6.9	320	264	
" "	" "	" 31	1	19.0	0.0	00.0	325	1,100,000	7.2	290	304	
" "	" "	Nov. 5	1	14.5	4.1	39.7	30.8	43,000	6.9	120	134	124
Cypress Creek - Below Central City, Ky.	GrPoC 82	Oct. 30	**	14.0	0.0	00.0	19.1	93,000	7.3	40	130	218
" "	" "	Nov. 4	**	11.5	0.0	00.0	20.2	9,100	6.9	20	164	
" "	" "	" 7	**	7.0	1.6	13.1	24.2	24,000	7.3	35	132	
Pond River - Below mouth - Rumsey, Ky.	GrPo 57	Oct. 30		17.0	7.6	77.5	1.9	4	7.6	25	94	
" "	" "	Nov. 4	**	15.0	6.8	67.3	2.1	2	7.3	15	82	114
" "	" "	" 7	1	9.0	6.9	58.9	3.2	2	6.9	20	52	
Panther Creek At mouth	GrPa 30	Oct. 30	3	18.0	6.6	69.4	2.0	2	7.8	8	200	
" "	" "	Nov. 4	2	20.0	7.6	83.3	1.5	2	7.7	8	230	
" "	" "	" 7	5	12.0	7.4	68.3	2.3	46	7.5	85	154	158
Green River - Above Lock & Dam #1	Gr 9	Oct. 30	420	16.5	7.9	80.6	1.0	1	7.7	5	10[illegible]	
" "	" "	Nov. 4	1,000	19.0	7.0	75.1	0.8	1	7.[illegible]	114	108	
" "	" "	" 7	1,440	12.5	7.4	69.5	1.2	1	7.6	8	92	
Green River - Bridge at Spottsville, Ky.	Gr 8.6	Aug. 28	510	27.0	7.2	89.7	1.2	**	7.7	22	104	
" "	" "	" 31	1,270	26.5	7.4	90.4	1.7	1	7.7	13	105	
" "	" "	Sept. 4	1,510	26.5	6.4	78.6	1.4	1	7.6	18	103	102
" "	" "	Oct. 30	667	18.0	8.4	88.1	0.4	1	7.8	13	126	125
" "	" "	" 31	667	17.0	8.1	83.4	0.6	**	7.7	13	126	
" "	" "	1941 Feb. 19	3,150	4.0	12.5	95.4	0.6	1	7.6	45	90	
" "	" "	" 20	3,350	4.0	12.5	95.0	1.0	2	7.5	70	91	122

* Seeded and Neutralized.

** Less than one.

TENNESSEE RIVER BASIN

Final Report to the Ohio River Committee

Ohio River Pollution Survey

U. S. Public Health Service
Cincinnati, Ohio
1942

TENNESSEE RIVER BASIN

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T-6 Chart - Summer Low-Flow Frequency Curve 776

Fig. T-1

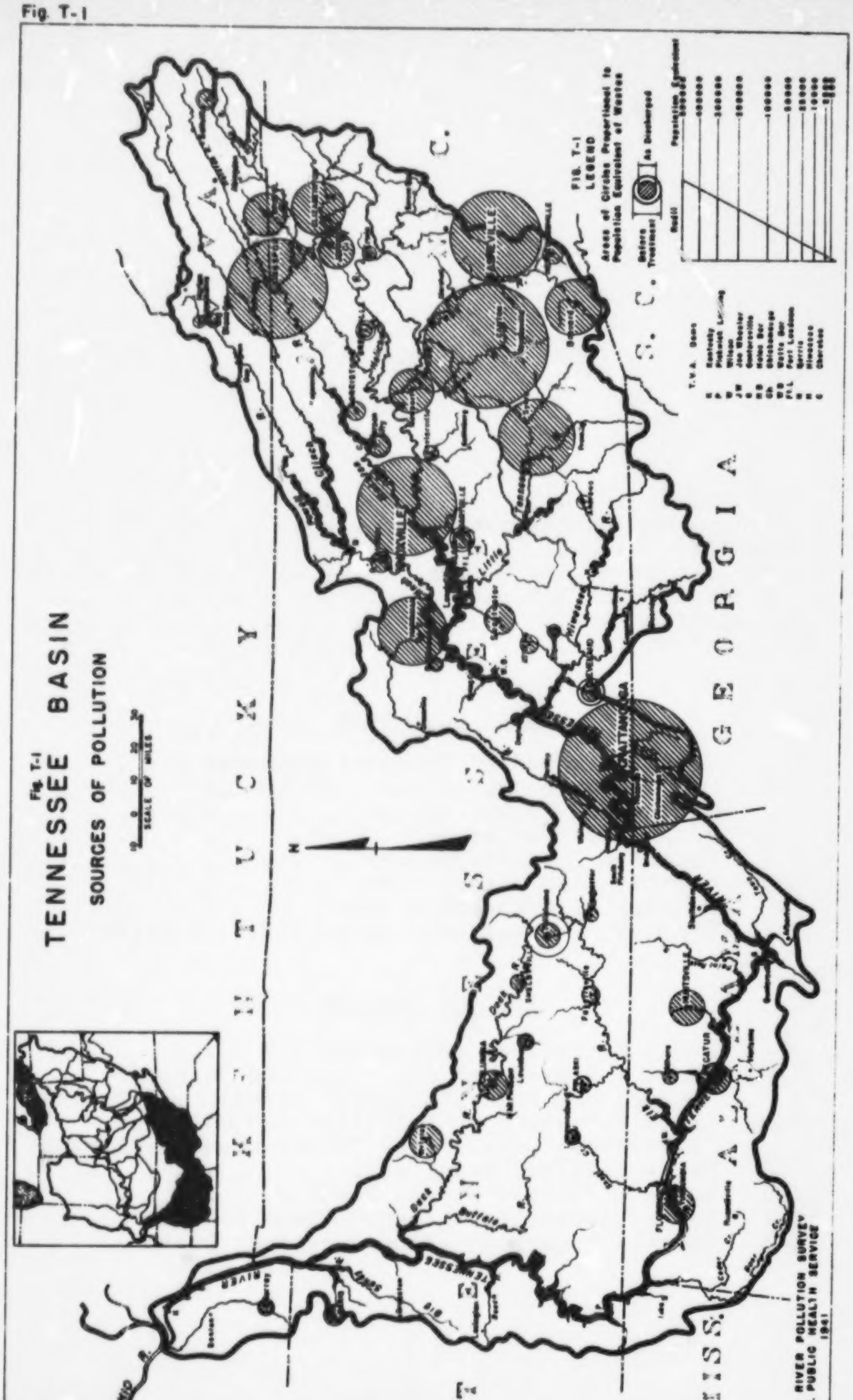
Fig. T-1
TENNESSEE BASIN
SOURCES OF POLLUTION
10 0 10 20 30
SCALE OF MILES
N
KENTUCKY
GEORGIA
ALA.
MISS.
N. C.
S. C.
VA.
KNOXVILLE
CHATTANOOGA
ASHEVILLE
DECATUR
OHIO R.
TENNESSEE RIVER
Buffalo
Little
FIG. T-1
LEGEND
Areas of Circles Proportional to Population Equivalent of Wastes
Before Treatment
As Discharged
Radii
Population Equivalent
500000
400000
300000
200000
100000
50000
25000
10000
T.V.A. Dams
Kentucky
Pickwick Landing
Wilson
Joe Wheeler
Guntersville
Hales Bar
Chickamauga
Watts Bar
Fort Loudoun
Norris
Hiwassee
Cherokee
OHIO RIVER POLLUTION SURVEY
U. S. PUBLIC HEALTH SERVICE
1941

TENNESSEE RIVER BASIN

Syllabus and Conclusions

Syllabus

The Tennessee River Basin drains portions of seven southern states comprising a total area of 40,600 square miles. The larger cities located in the basin are Chattanooga and Knoxville, Tennessee and Asheville, North Carolina. The area is predominantly rural with a few highly developed industrial areas. The abundance of good water supplies and natural resources has been influential in the industrial development. Scant progress has been made toward pollution abatement. Known methods of treatment, if applied, would greatly reduce the pollutional load carried by the stream. Additional effort is needed to develop methods of industrial waste treatment for certain major sources of industrial pollution.

Conclusions

(1) Most of the water supplies in this basin are adequate and dependable. Small supplies are, in general, taken from ground water sources while the larger supplies are from surface waters. In general, water supplies are not seriously affected by pollution except at Knoxville where industrial wastes from upstream plants have damaged the supply.

(2) Sewage from a population of about 592,000 and industrial wastes with a population equivalent of 1,306,000 are produced in this area. Only twenty percent of the domestic sewage receives any treatment and one-third of this treatment is in obsolete and ineffective plants. Existing municipal sewage treatment reduces the combined pollutional load of 1,897,000 to a pollutional equivalent of about 1,833,000 or about 3 percent. In addition, about 20 percent of the waste-producing industries have taken at least minor steps to reduce pollution either by treatment or alteration within the plant.

(3) The more important points where high bacterial pollution was observed were below Asheville and Canton, North Carolina, and Kingsport, Knoxville, Chattanooga and Columbia, Tennessee. Poor oxygen conditions were found on the Tennessee River below Knoxville and Chattanooga, and on the tributaries the more important points were below Bristol, Copperhill, Cleveland, Kingsport and Tullahoma, Tennessee and Canton, North Carolina.

(4) The major sources of pollution are found in the upper half of the basin, principally in Tennessee and North Carolina. A number of sections of tributary streams are grossly polluted, which creates problems that are primarily of a local nature. Conditions on the main river are good except in the vicinity of Knoxville and Chattanooga.

(5) The expected increase of low water flow by the Tennessee Valley Authority's stream control program will improve stream conditions in the main river. Benefits that accrue to stream improvement will largely be intangible but nonetheless desirable.*

(6) In view of the normal uses of the streams involved, refined treatment at certain sources of pollution would serve no purpose commensurate with the expenditure. In these instances primary treatment appears justified. A summary of comparative costs of remedial measures from Table T-1 follows:

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* Some of the reservoirs being constructed in connection with the defense program may have an appreciable effect on pollution. Data are not yet available which would permit an evaluation of these effects.

Treatment	Capital Cost	Annual Charges
Existing	$2,750,000	$250,000
Suggested additional	24,480,000	2,035,000

Estimated additional costs over existing charges of programs involving uniform treatment throughout the basin are:

Primary, all places	$23,440,000	$1,865,000
Secondary, all places	28,840,000	2,495,000

Table T-1 Tennessee River Basin - Estimated Cost of Existing and Suggested Minimum Corrective Measures for Municipal and Industrial Wastes, with Comparative Costs for Primary and Secondary Treatment.

	Number of Plants Prim.	Number of Plants Sec.	Population Connected to Sewers	Capital Investment (Dollars)	Annual Charges (Dollars) Amort. & Interest	Annual Charges (Dollars) Operation & Main.	Annual Charges (Dollars) Total
Existing Sewage Treatment	26	18	98,400	2,750,000	170,000	80,000	250,000
Suggested Minimum Correction							
Sewage Treatment Plants	64	37	489,400	7,420,000	520,000	395,000	915,000
Required Interceptors				15,450,000	725,000	-	725,000
Independent Industrial Waste Correction	-		-	1,610,000	205,000	190,000	395,000
Total				24,480,000	1,450,000	585,000	2,035,000
Comparative Cost							
Primary Treatment All Waste				23,440,000	1,385,000	480,000	1,865,000
Secondary Treatment All Waste				28,840,000	1,755,000	740,000	2,495,000
As Suggested				24,480,000	1,450,000	585,000	2,035,000

Description

The Tennessee River is formed by the confluence, in east central Tennessee, of the Holston and French Broad Rivers, whose headwaters are in western Virginia and North Carolina. From this confluence the river flows southwesterly to Guntersville, Alabama, thence northwesterly to the northeast corner of Mississippi and finally northward through Tennessee and Kentucky to its confluence with the Ohio River at Paducah. The basin is roughly crescent in shape, somewhat constricted at its center where the river cuts through the Cumberland Plateau in the vicinity of Chattanooga. The two areas thus formed are approximately equal in size but are dissimilar in physical characteristics. The upper area is mountainous with swift flowing streams and narrow valleys while the lower area is rolling with broad flood plains and sluggish streams.

The drainage area of 40,600 square miles and the 1940 population of 2,941,298 are divided among seven states as follows:

State	Drainage Area Square Miles	Population - 1940 Urban	Rural	Total
Alabama	6,810	79,464	310,585	390,049
Georgia	1,490	3,538	61,371	64,909
Kentucky	1,055	3,773	43,665	47,438
Mississippi	385	0	15,055	15,055
N. Carolina	5,490	67,729	251,230	318,959
Tennessee	22,290	445,337	974,450	1,419,787
Virginia	3,080	32,100	203,001	235,101
Total	40,600	631,941	1,859,357	2,491,298

	Populations			
Larger Cities	1910	1920	1930	1940
Chattanooga, Tenn.	44,604	57,895	119,798	128,163
Knoxville, Tenn.	36,346	77,818	105,802	111,580
Asheville, N.C.	18,762	28,504	50,193	51,310
Johnson City, Tenn.	8,502	12,442	25,080	25,332
Total Basin				
Urban	212,110	350,270	549,125	631,941
Rural	1,579,533	1,624,770	1,667,953	1,859,357
Total	1,791,743	1,975,040	2,217,078	2,491,298

Major Tributaries	River Mile	Drainage Area Square Miles	States
Duck River	110.7	3,560	Tennessee
Elk River	285.1	2,330	Tenn., Ala.
Hiwassee River	499.5	2,660	Tenn., N.C., Ga.
Clinch River	567.7	4,400	Tenn., Va.
Little Tenn. R.	601.3	2,650	Tenn., N.C., Ga.
French Broad R.	652.1	5,140	Tenn., N.C.
Holston River	652.1	3,810	Tenn., Va.

Resources - The basin is rich in natural resources; tillable land, forest and water power are abundant. Coal, asphalt, clay, sand and gravel, limestone, phosphate rock, iron, zinc and copper ore are found in important quantities.

Industries - While primarily a rural area, over 1,000 industrial plants are found in the basin. Extensive agricultural activity is found although, in general, it is on a small scale. Practically every type of industry is represented, wood products and textile manufacturing plants predominating. With the advent of cheap power developed by the Tennessee Valley Authority, an increase in industrial developments is anticipated, particularly in the metallurgical field. Dairying shows a significant increase in middle Tennessee.

Water Uses - Climate, character of population, and adequate water supply have been influential in the development of this area. Surface waters supply the major demands of both industry and domestic users. Ground water supplies are generally used for smaller installations. The Tennessee Valley Authority's development of the river, when complete, will provide for power development, flood protection, and a 9-foot navigation channel from the Ohio River to Knoxville. Recreational facilities are being developed and extensively enjoyed.

Presentation of Field Data

Figures T-2A and T-2B show all sources of pollution of consequence on the Tennessee River and its tributaries. The location, magnitude and reduction by present treatment of each source of pollution are indicated as well as the location of tributaries, water supply intakes and other pertinent information. Laboratory data during the months of lowest oxygen concentration, found while sampling, are plotted for four sections of the main stream so that the effect of the indicated sources of pollution may be observed.

Public Water Supplies - Of the 244 public water supplies in the basin serving some 871,000 people, 76 are wholly or in part from surface sources. Forty-two of these are from impounding reservoirs and eleven more are from streams not subject to pollution. The remaining 23 supplies, serving 394,700 people are from streams subject to varying amounts of pollution. Table T-2 shows data on these supplies.

In general, the water supplies are adequate and have been an important factor in recent industrial growth. The character of supplies obtained from the main river may be expected to change due to transition from river to lake conditions. There will be a tendency for algae to increase and chemical quality to become more uniform. Turbidities will decrease.

Taste and odor troubles have been experienced at Knoxville attributed to industrial wastes.

Sewerage - There are 170 sewered municipalities in the basin, 44 of which have sewage treatment plants, other than septic tanks. In general, treatment is found only in the smaller communities that are located on tributaries. Table T-3 summarizes the sewered population together with industrial wastes.

Industrial Wastes - Data on 227 waste producing industrial plants are summarized in Table T-4. Pulp and paper industries and chemical plants are the largest producers of industrial pollution. These two types of industry account for over half of the basin's pollution load and constitute the major problem of pollution control. The sewered population equivalent of industrial waste discharged to municipal sewers is 123,500 or about 10 percent of the total industrial waste.

Table T-2 Tennessee Basin - Surface Water Supplies

Supply	State	Source	Mile (1)	Treatment (2)	Population Served	Cons. M.G.D.
Supplies Below Community Sewer Outfalls						
Kentucky Dam	Ky.	Tennessee R. (3)	22	FD	800	0.11
Sheffield	Ala.	" "	254	FD	14,400	0.75
Wilson Dam #2	"	" "	256.5	FD	3,500	1.30
Decatur	"	" "	304.5	FD	16,200	1.00
Guntersville	"	" "	357.5	FD	3,500	0.27
Bridgeport	"	" " (3)	415	FD	2,100	0.08
S.Pittsburg	Tenn.	" "	418	FD	2,700	0.14
Guild	"	" " (3)	431.2	FD	100	0.05
Chattanooga,	"	" "	466	FD	152,000	19.03
Lenoir City	"	" " - Little Tennessee R	601.3	FD	4,500	0.46
Knoxville	"	Tennessee R.	648.	FD	120,000	10.00
Columbia	"	Duck River	243	FD	12,000	0.74
Shelbyville	"	" "	332	FD	7,400	0.45
Hiwassee Dam	N.C.	Hiwassee River	575	FD	200	0.06
Harriman	Tenn.	Emory River	584	FD	5,900	0.47
Oakdale	"	" "	589	FD	400	0.02
St. Paul	Va.	Clinch River	823	FD	700	0.02
Richlands	"	" "	888	FD	2,200	0.09
John Sevier	Tenn.	Holston River	660	FD	200	0.01
Morristown	"	Spring-Well- Holston River (3)	731	FD	8,500	0.77
Kingsport	"	S.Fk.Holston R. (3)	799	FD	17,600	1.30
Bristol	"	" " " "	850	FD	13,000	0.95
Greenville	"	Nolichucky R. (3)	775	FD	6,800	0.58
Total - 23 Below Sewer Outfalls					394,700	38.65
53 Other Surface Supplies					213,800	21.32
Total - Surface Water Supplies					608,500	59.97

(1) Miles above mouth of Tennessee River.
(2) F - Coagulated, settled, filtered; D - Chlorinated.
(3) A part of supply is from ground water sources.

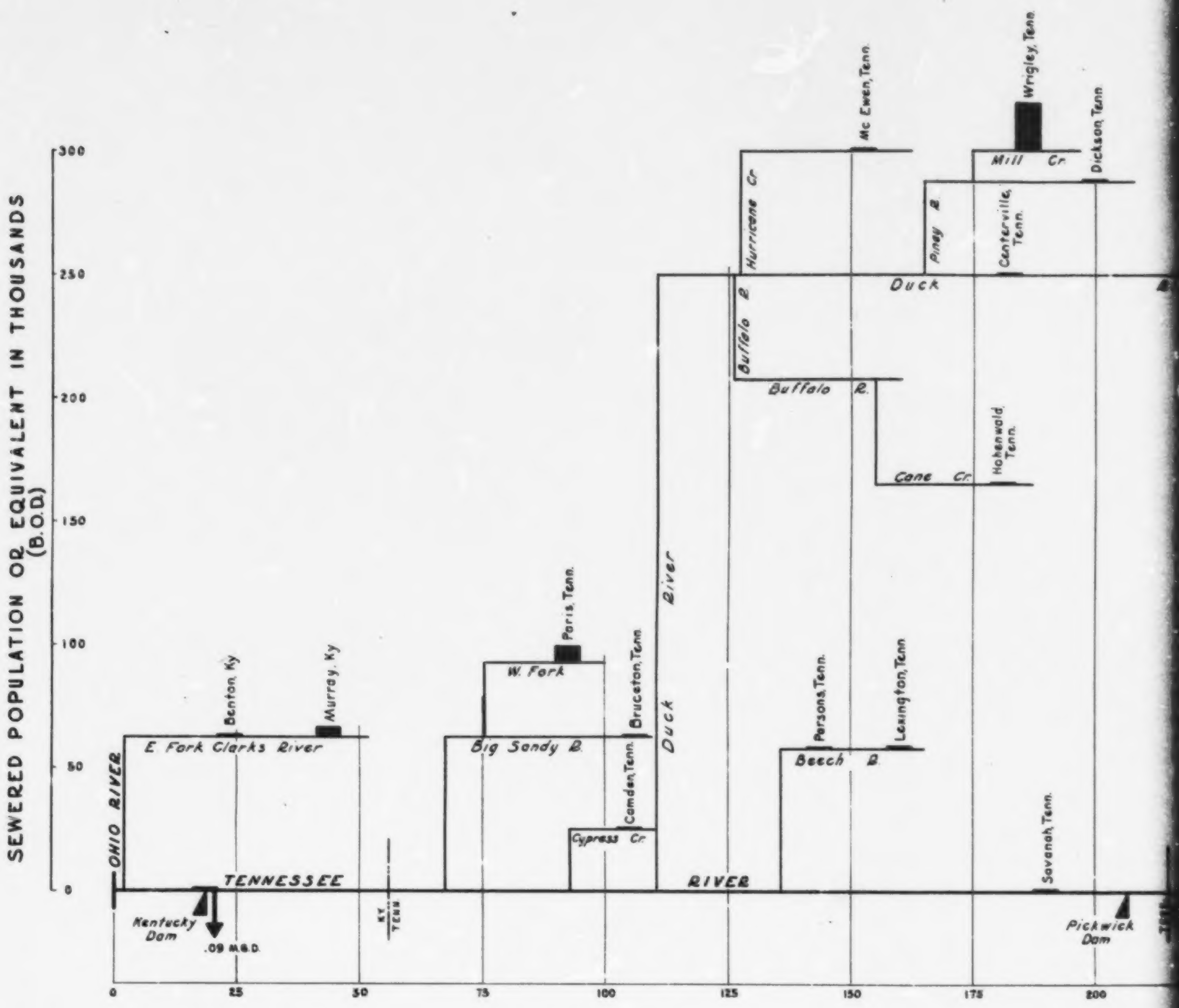
Table T-3 Tennessee River Basin - Sources of Significant Pollution Including Industrial Wastes Expressed as Sewered Population Equivalent (B.O.D.)

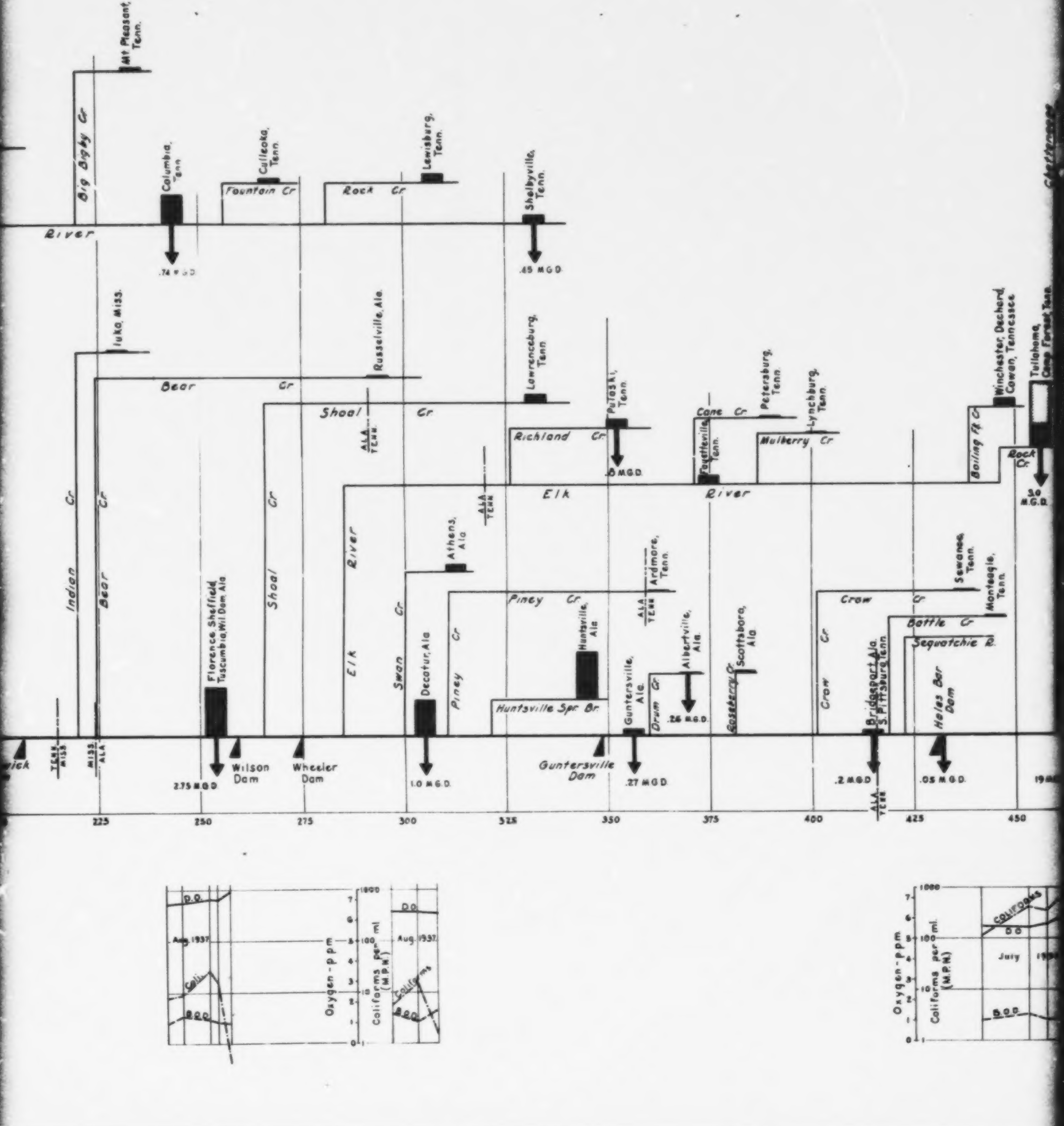
Municipality	Tributary	Receiving Stream	River Mileage From Mouth of		Population Connected to Sewers	Treatment	Sewered Population Equivalent (B.O.D.)	
			Tenn.R.	Trib.			Untreated	Discharged
Sheffield, Ala.	Tennessee River		252	-	5,000	None	5,800	5,800
Florence, Ala.	" "		258	-	8,300	Tank	11,900	11,900
Wilson Dam, Ala.	" "		258	-	3,300	Pri.	3,300	2,100
Decatur, Ala.	" "		304.5	-	14,000	None	17,500	17,500
Guntersville, Ala.	" "		357.5	-	3,000	"	3,000	3,000
Chattanooga, Tenn.	" "		462	-	102,500	Tank	313,300	313,300
Dayton, Tenn.	" "		504.4	-	1,200	Pri.	2,900	1,900
Loudon, Tenn.	" "		591.6	-	1,500	None	5,100	5,100
Lenoir City, Tenn.	" "		601.0	-	2,200	Tank	3,200	3,200
Knoxville, Tenn.	" "		647	-	90,600	None	171,400	171,400
Murray, Ky.	Clarks Run	East Fork	44	42	3,600	Pri.	3,900	2,600
Paris, Tenn.	Big Sandy River	Baily Fork	107	40	7,100	Tank	7,100	7,100
Wrigley, Tenn.	Duck River	Mill Creek	186.6	75.9	0	None	19,300	19,300
Columbia, Tenn.	" "	Duck River	243.3	132.6	7,400	"	14,200	14,200
Lewisburg, Tenn.	" "	Big Rock Cr.	308	197.4	2,200	Sec.	4,000	600
Shelbyville, Tenn.	" "	Duck River	332	221.3	3,300	None	4,300	4,300
Tuscumbia, Ala.	Tuscumbia Spring Branch		252	2	3,000	"	3,000	3,000
Lawrenceburg, Tenn.	Shoal Creek	Shoal Creek	325.8	66.1	3,600	Pri.	3,800	2,500
Pulaski, Tenn.	Elk River	Richland Creek	352.0	66.7	3,200	None	4,400	4,400
Fayetteville, Tenn.	" "	Elk River	375	90.0	3,600	Tank	4,800	4,800
Winchester, Tenn.	" "	Boiling Fk.Cr.	444.7	159.7	2,300	"	3,300	3,300
Tullahoma, Tenn.	" "	Rock Creek	458.5	173.3	2,700	"	6,000	6,000
Camp Forrest, Tenn.	" "	" "	456.2	171.0	28,000	Sec.	28,000	4,200
Athens, Ala.	Swan Creek		314	13	3,500	None	3,500	3,500
Huntsville, Ala.	Huntsville Spring Creek		339.4	18.6	19,100	"	20,200	20,200
Rossville, Ga.	Chattanooga Creek		466.9	6.7	2,000	Pri.	51,100	50,400
Chickamauga, Ga.	South Chickamauga Creek		505.2	37.0	1,200	Tank	7,600	7,600
Ft. Oglethorp, Ga.	" " "		481.4	13.2	3,500	Sec.	3,500	500
Cleveland, Tenn.	Hiwassee R.	S.Mouse Creek	552	33.0	7,000	"	12,200	6,300
Athens, Tenn.	" "	Oostanaula Cr.	547.3	47.8	5,700	None	6,300	6,300
Etowah, Tenn.	" "	Cane Creek	555.0	55.5	2,600	Pri.	2,600	1,700
Andrews, N. C.	" "	Valley River	613.3	113.8	1,500	None	3,600	3,600
Rockwood, Tenn.	King Creek		556.3	4.4	2,000	Pri.	2,600	1,900
Harriman, Tenn.	Emory River		583	12	3,000	None	82,400	82,400
Clinton, Tenn.	Clinch River		627	59	1,600	"	6,800	6,800
Big Stone Gap, Va.	Powell River		836	180	3,400	"	3,400	3,400
Appalachia, Va.	" "		839	183	2,500	"	2,500	2,500
Sweetwater, Tenn.	Sweetwater Creek		604	19	2,400	Tank	16,000	16,000
Sylva, N. C.	Little Tenn. R.	Scott Creek	701.2	99.7	900	None	99,600	99,600
Alcoa, Tenn.	Little River	Pistol Creek	648	5.	4,700	Sec.	4,700	700
Maryville, Tenn.	" "	" "	649	6	5,800	Pri.	6,000	4,000
Jefferson City, Tenn.	Holston River	Mossy Creek	705.5	53	1,000	"	7,600	7,300
Morristown, Tenn.	" "	Turkey Creek	730.0	79	5,500	None	6,800	6,800
Kingsport, Tenn.	" "	S.Holston R.	799	147	9,600	"	179,100	179,100
Johnson City, Tenn.	Watauga River	Brush Creek	837	25	20,300	"	20,700	20,700
Elizabethton, Tenn.	" "	Watauga River	839	25	7,300	"	53,900	53,900
Bristol, Tenn.	S.Holston, R.	Beaver Creek	833	39.8	8,400	"	9,900	9,900
Bristol, Va.	" " "	" "	834	40.8	6,500	"	23,500	23,500
Marion, Va.	" " "	M. Holston R.	908	113.7	7,000	Pri.	7,000	4,500
Sevierville, Tenn.	Little Pigeon River		684.5	5.0	400	None	3,300	3,300
Greeneville, Tenn.	Nolichucky R.	Richland Cr.	775.3	54.1	5,200	Sec.	6,400	2,600
Erwin, Tenn.	" "	No. Indian Cr.	721.2	90	3,400	None	3,400	3,400
Newport, Tenn.	Pigeon River		733	7	2,100	"	31,800	31,800
Waynesville-Hazelwood, N. C.	" "		782	54	3,400	"	16,300	16,300
Canton, N. C.	" "		789	63	5,100	"	260,100	260,100
Buncomb Co., N. C.	French Broad River		800	149	67,500	(1)	151,300	149,700
Brevard, N. C.	" " "		846	194	2,300	None	6,000	6,000
Rosman, N. C.	" " "		863	206	0	"	7,200	7,200
Hendersonville, N. C.	French Broad R.	Mud Creek	826	8	5,100	"	6,300	6,300
Pisgah Forest, N. C.	" "	Davidson R.	[illegible].8	192	0	"	41,400	41,400
Small Sources (128 towns)					57,200	Various	77,200	69,900
Total					591,300		1,897,300	1,832,600

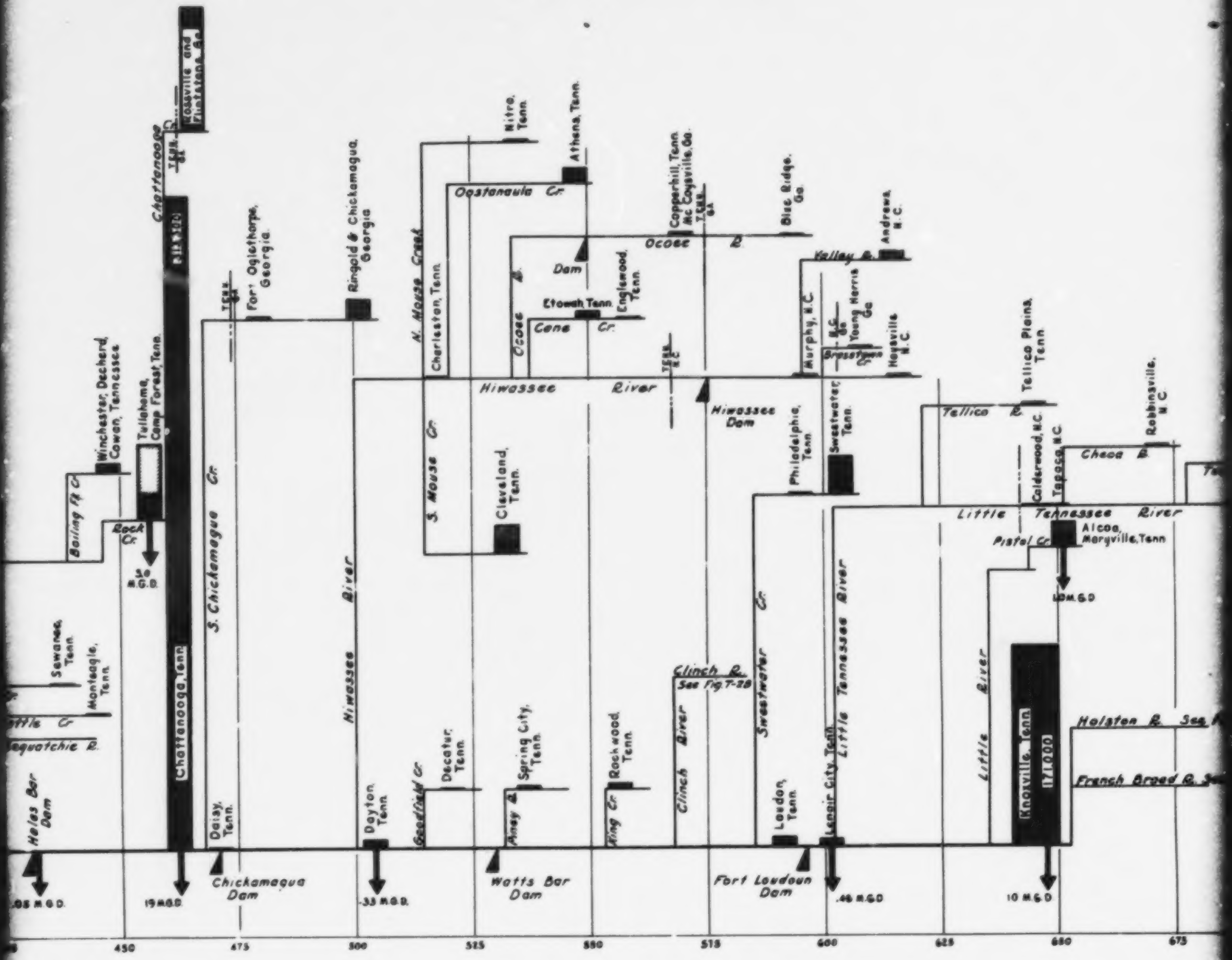
(1) Two small secondary treatment plants serve 1900 population.

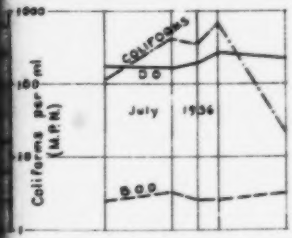
Table T-4 Tennessee River Basin - Summary of Industrial Wastes not Discharging to Municipal Treatment Plants, with Total of Entire Industrial Waste Load in the Basin.

Industry	Number of Plants	Industrial Waste Disposal		At Least Minor Corrective Measures Taken	Estimated Sewered Population Equivalent (B.O.D.)
		Munic. Sewers	Private Outlet		
Cannery	24	6	18	2	38,400
Chemical	21	2	19	11	353,200
Meat	19	11	8	2	40,200
Milk	26	17	9	2	9,500
Pulp & Paper	9	2	7	8	584,400
Tannery	9	2	7	2	79,900
Textiles	80	37	43	1	138,700
Miscellaneous	39	4	35	13	56,300
Waste Unconnected Munic. Treatment	227	81	146	41	1,300,600
Wastes Discharged to Municipal Treatment					5,400
Total Industrial Waste in the Basin					1,306,000
By States - Alabama					9,400
Georgia					57,000
Kentucky					300
Mississippi					0
North Carolina					508,500
Tennessee					712,500
Virginia					18,300

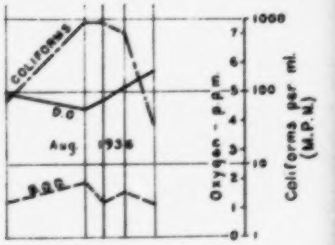

SEWERED POPULATION OR EQUIVALENT IN THOUSANDS
(B.O.D.)
0
50
100
150
200
250
300
OHIO RIVER
TENNESSEE
RIVER
E. Fork Clarks River
Benton, Ky
Murray, Ky
Kentucky Dam
.09 M.G.D.
KY. TENN.
Big Sandy R.
W. Fork
Paris, Tenn.
Bruceton, Tenn.
Cypress Cr.
Camden, Tenn.
Duck River
Buffalo R.
Hurricane Cr.
Mc Ewen, Tenn.
Cane Cr.
Hohenwald, Tenn.
Beech R.
Persons, Tenn.
Lexington, Tenn.
Duck
Piney R.
Centerville, Tenn.
Mill Cr.
Wrigley, Tenn.
Dickson, Tenn.
Savanah, Tenn.
Pickwick Dam
0
25
50
75
100
125
150
175
200


Mt Pleasant, Tenn.
Big Bigby Cr
Columbia, Tenn.
Culleoka, Tenn.
Fountain Cr
Lewisburg, Tenn.
Rock Cr
Shelbyville, Tenn.
River
.74 M.G.D.
.45 M.G.D.
Iuka, Miss.
Russelville, Ala.
Bear Cr
Lawrenceburg, Tenn.
Shoal Cr
ALA TENN
Pulaski, Tenn.
Richland Cr
.8 M.G.D.
Cane Cr
Petersburg, Tenn.
Lynchburg, Tenn.
Fayetteville, Tenn.
Mulberry Cr
Winchester, Dechard, Cowan, Tennessee
Tullahoma, Camp Forrest Tenn.
Boiling Fk. C
Rock Cr
3.0 M.G.D.
Elk River
ALA TENN
Indian Cr
Bear Cr
Shoal Cr
Elk River
Athens, Ala
Swan Cr
Piney Cr
Piney Cr
Ardmore, Tenn.
ALA TENN
Huntsville, Ala
Huntsville Spr. Br.
Albertville, Ala.
Guntersville, Ala.
Drum Cr
.26 M.G.D.
Roseberry Cr
Scottsboro, Ala
Crow Cr
Crow Cr
Sewanee, Tenn.
Monteagle, Tenn.
Battle Cr
Sequatchie R.
Bridgeport Ala.
S. Pittsburg, Tenn.
Hales Bar Dam
Florence, Sheffield, Tuscumbia, Wil. Dam Ala
Decatur, Ala
wick
TENN MISS
MISS ALA
2.75 M.G.D.
Wilson Dam
Wheeler Dam
1.0 M.G.D.
Guntersville Dam
.27 M.G.D.
.2 M.G.D.
ALA TENN
.05 M.G.D.
225
250
275
300
325
350
375
400
425
450
D.O.
Aug. 1937
Coli.
B.O.D.
Oxygen - p.p.m.
Coliforms per ml (M.P.N.)
0
1
2
3
4
5
6
7
1
10
100
1000
D.O.
Aug. 1937
Coliforms
B.O.D.
Oxygen - p.p.m.
Coliforms per ml. (M.P.N.)
0
1
2
3
4
5
6
7
1
10
100
1000
COLIFORMS
D.O.
July
B.O.D.


Rossville and Flintstone, Ga.
Tenn. Ga.
Chattanooga Cr.
Chattanooga, Tenn.
Fort Oglethorpe, Georgia
Ringold & Chickamauga, Georgia
Nitro, Tenn.
Athena, Tenn.
Oostanaula Cr.
N. Mouse Creek
Charleston, Tenn.
Ocoee R.
Dam
Etowah, Tenn.
Englewood, Tenn.
Cane Cr.
Copperhill, Tenn. Mc Caysville, Ga.
Tenn. Ga.
Ocoee R.
Blue Ridge, Ga.
Andrews, N.C.
Valley R.
Murphy, N.C.
N.C. Ga.
Young Harris, Ga.
Brasstown Cr.
Hayesville, N.C.
Tenn. N.C.
Hiwassee River
Hiwassee Dam
Winchester, Decherd, Cowan, Tennessee
Tullahoma, Camp Forest, Tenn.
Boiling Fk. C.
Rock Cr.
30 M.G.D.
Sewanee, Tenn.
Monteagle, Tenn.
Little Cr.
Sequatchie R.
Hales Bar Dam
.05 M.G.D.
S. Chickamauga Cr.
Daisy, Tenn.
19 M.G.D.
Chickamauga Dam
Hiwassee River
S. Mouse Cr.
Cleveland, Tenn.
Dayton, Tenn.
.33 M.G.D.
Goodfield Cr.
Decatur, Tenn.
Piney R.
Spring City, Tenn.
Watts Bar Dam
King Cr.
Rockwood, Tenn.
Clinch River
Clinch R. See Fig. T-28
Sweetwater Cr.
Philadelphia, Tenn.
Sweetwater, Tenn.
Loudon, Tenn.
Fort Loudoun Dam
Lenoir City, Tenn.
.46 M.G.D.
Little Tennessee River
Tellico R.
Tellico Plains, Tenn.
Calderwood, N.C.
Tapoco, N.C.
Cheoa R.
Robbinsville, N.C.
Little Tennessee River
Pistol Cr.
Alcoa, Maryville, Tenn.
1.0 M.G.D.
Little River
Knoxville, Tenn.
171,000
10 M.G.D.
Holston R. See F
French Broad R. Se
450
475
500
525
550
575
600
625
650
675



NOTE: LABORATORY RESULTS FOR WORST MONTH OF RECORD AND PRIOR TO COMPLETION OF CHICKAMAUGA, GUNTERSVILLE AND FORT LOUDOUN DAMS.



LEGEND

◢ Dam

■ Indicated Pollution Removed by Treatment

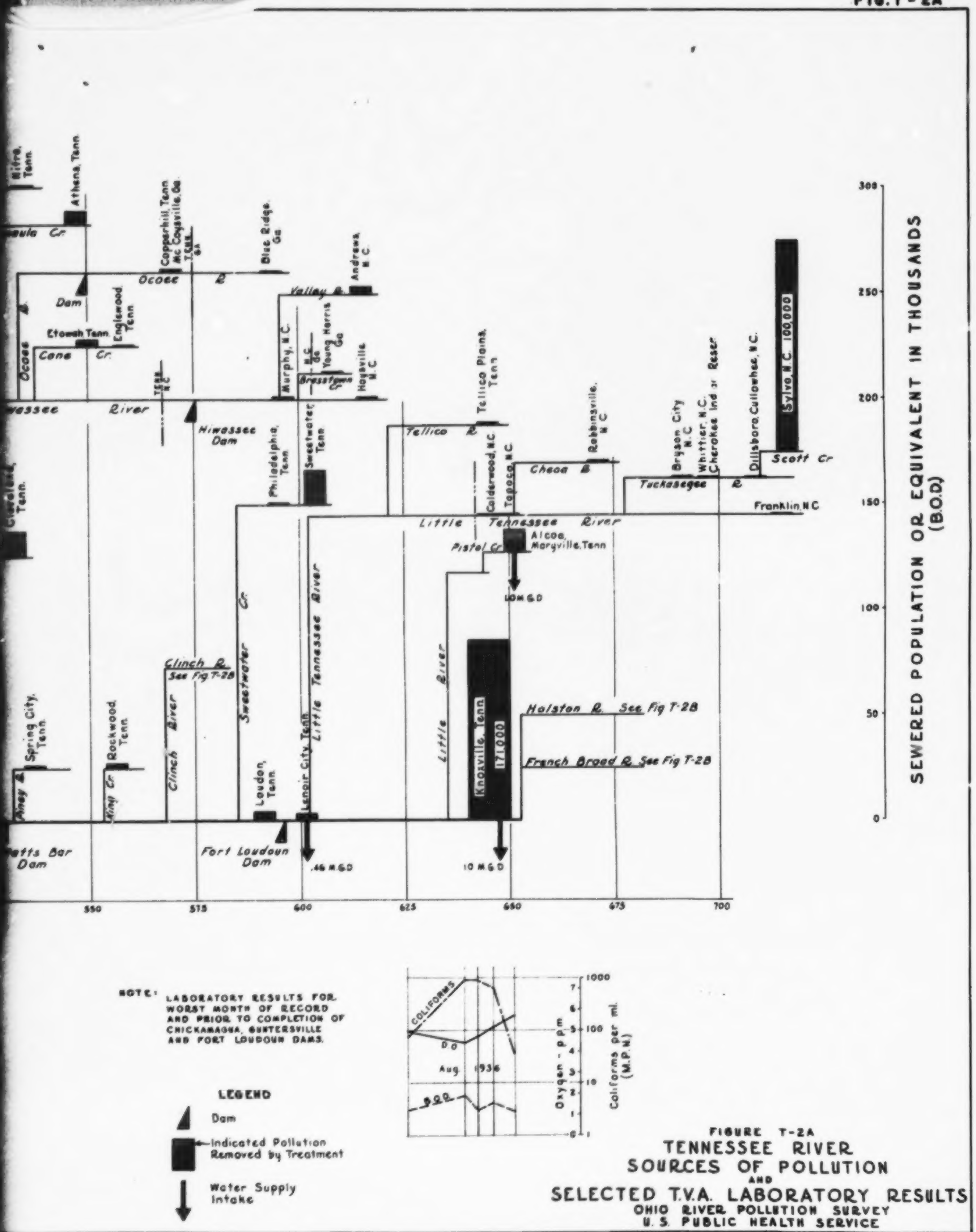
↓ Water Supply Intake

SC

SELECTED

O

FIG. T - 2A



NOTE: LABORATORY RESULTS FOR WORST MONTH OF RECORD AND PRIOR TO COMPLETION OF CHICKAMAUGA, GUNTERSVILLE AND FORT LOUDOUN DAMS.

FIGURE T-2A
TENNESSEE RIVER
SOURCES OF POLLUTION
AND
SELECTED T.V.A. LABORATORY RESULTS
OHIO RIVER POLLUTION SURVEY
U. S. PUBLIC HEALTH SERVICE

766-B

FIG. T-28

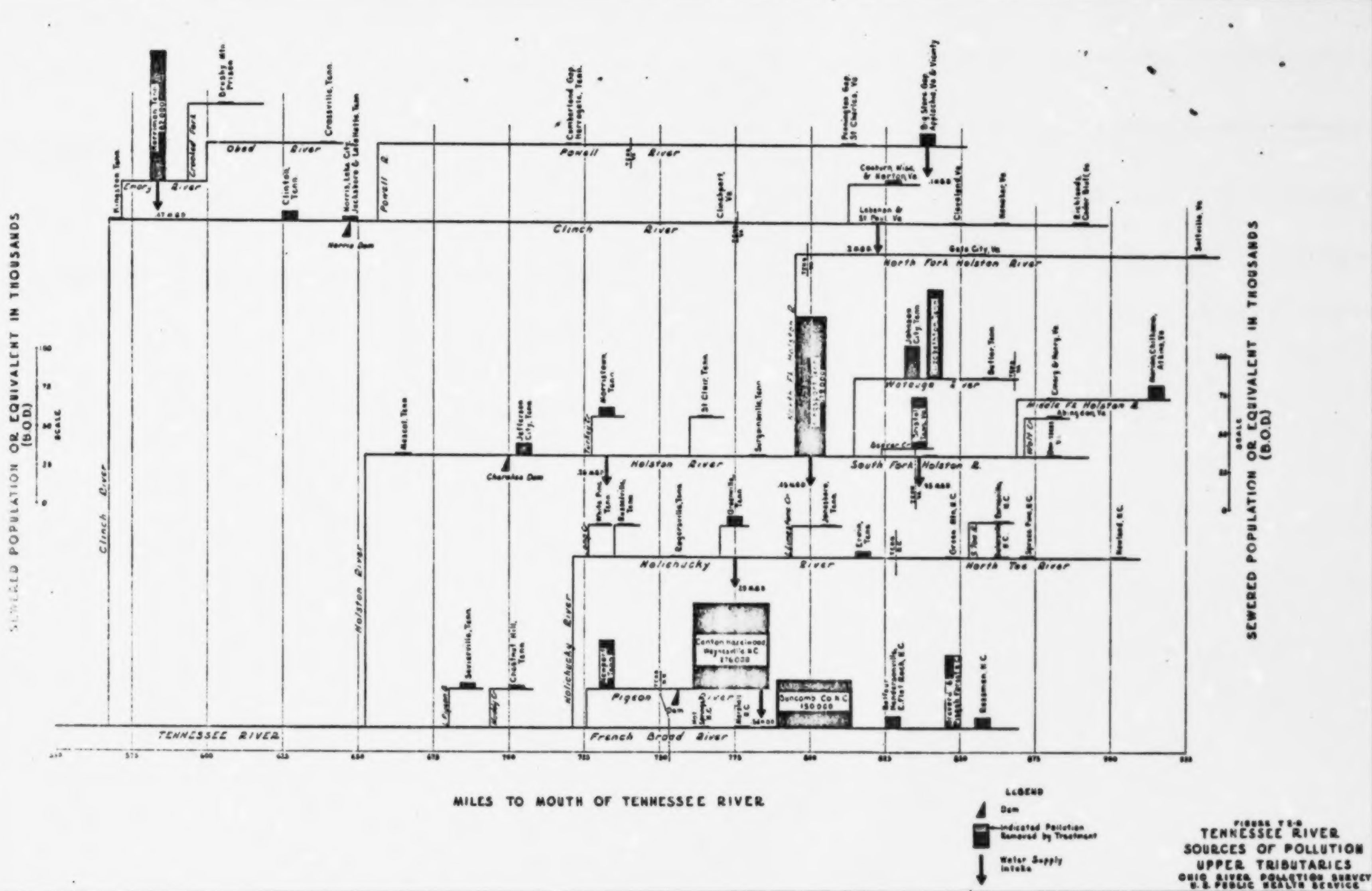

SEWERED POPULATION OR EQUIVALENT IN THOUSANDS
(B.O.D)
SCALE
0
25
50
75
100
Clinch River
Kingston Tenn
Emory River
Harriman Tenn 82,000
47,000
Crooked Fork
Brushy Mt. Prison
Obed River
Clinton Tenn
Crossville, Tenn
Norris, Lake City, Jacksboro & Lafollette Tenn
Norris Dam
Powell R
Cumberland Gap Harrogate, Tenn.
Powell River
Clinch River
Clinchport, Va
Pennington Gap St Charles, Va
Big Stone Gap Appalachia, Va & Vicinity
Coeburn Wise, & Norton Va
Lebanon & St Paul Va
Cleveland, Va
Honaker, Va
Richlands, Cedar Bluff, Va
2000
Gate City, Va
North Fork Holston River
Saltville, Va
Holston River
Rossel Tenn
Jefferson City, Tenn
Cherokee Dam
Turkey Cr
Morristown Tenn
St Clair, Tenn
Surgoinsville, Tenn
North Fk Holston R
Holston River
South Fork Holston R.
Johnson City Tenn
Watauga River
Butler, Tenn
Bristol Tenn, Va
Beaver Cr
Emory & Henry, Va
Middle Fk Holston R
Abingdon, Va
Wolf Cr
Marion, Chilhowie, Atkins, Va
White Pine, Tenn
Russellville, Tenn
Rogersville, Tenn
Greeneville, Tenn
Lick Creek Cr
Jonesboro, Tenn
Erwin, Tenn
Green Mtn, N C
Burnsville, N C
S Toe R
Spruce Pine, N C
Newland, N C
Nolichucky River
North Toe River
20,000
Sevierville, Tenn
Chestnut Hill, Tenn
Nolichucky River
Newport Tenn
Pigeon River
Dam
Hot Springs N C
Marshall N C
Canton Hazelwood Waynesville N C 276,038
Buncombe Co N C 150,000
Balfour Hendersonville, E. Flat Rock, N C
Brevard & Pisgah Forest N C
Rosman N C
TENNESSEE RIVER
French Broad River
575
600
625
650
675
700
725
750
775
800
825
850
875
900
925
MILES TO MOUTH OF TENNESSEE RIVER
LEGEND
Dam
Indicated Pollution Removed by Treatment
Water Supply Intake

FIGURE T-6
TENNESSEE RIVER
SOURCES OF POLLUTION
UPPER TRIBUTARIES
OHIO RIVER POLLUTION SURVEY
U. S. PUBLIC HEALTH SERVICE

H6-H

Presentation of Laboratory Data

Complete summaries of laboratory results for the Tennessee River Basin are presented in Table T-7 and T-7A. A part of the laboratory observations for the Tennessee Basin were carried out by two mobile laboratory units during November, 1940 and January, February and March, 1941.

Since 1936, extensive stream pollution studies of the Tennessee River Basin have been carried on by the Tennessee Valley Authority in cooperation with the several states that make up this area. A report titled "Studies of the Pollution of the Tennessee River System", was published in February, 1941 and it is anticipated that subsequent reports will be made.

From March 1939 to February 1941 the Ohio River Pollution Survey actively cooperated with the Tennessee Valley Authority in their pollution studies. Data collected prior to 1939 have been made available to the Ohio River Pollution Survey and have been freely used in this report. Included with these data were chemical results on Duck River samples analyzed by the Tennessee Department of Health.

Selected monthly average laboratory results at some of the principal points in the basin are tabulated with flows on sampling days and the minimum monthly flows of record in Table T-5. Selected results have been chosen for low dissolved oxygen or high coliform findings and, in general, represent the most unfavorable conditions during sampling.

Figures T-3 and T-4 show the distribution of coliform bacteria and dissolved oxygen respectively, at the various sampling points throughout the basin, as based on average results during the most unfavorable month of observations at each point. In general, the higher coliform results tended to occur during months of high stages, whereas the lower dissolved oxygen results coincided with lower stream flows and high temperatures.

As indicated by bacteriological findings, over 90 percent of the sampling stations, not immediately below sources of pollution, showed coliform organism concentrations of less than 200 per ml. The more important points where high coliform results were found are below Asheville and Canton, North Carolina and Kingsport, Knoxville, Chattanooga and Columbia, Tennessee.

Poor oxygen conditions were found on the Tennessee River below Knoxville and Chattanooga and on the tributaries below Bristol, Canton, Copperhill, Cleveland, Tullahoma, Harriman, Kingsport and Sylva. The low oxygen results found below Bristol, Copperhill, Canton, Harriman, Kingsport and Sylva are largely due to industrial wastes.

Acid stream conditions were observed in the vicinity of Copperhill on the Ocoee River.

Figure T-2 shows dissolved oxygen, 5-day B.O.D. and coliform results for sections of the main river at Knoxville, Chattanooga, Decatur and Florence. These data were chosen for the month showing the most unfavorable dissolved oxygen conditions. These results are typical of a stream receiving pollution and show the effect of natural stream recovery.

Figure T-5 shows the results of biochemical oxygen demand analyses at the various sampling stations throughout the basin, and reflects the quantity of unstable organic material that must be oxidized.

Table T-5 Tennessee River Basin - Selected Laboratory Data

Main River - Most Unfavorable Dissolved Oxygen Results

River Location	Tennessee River Knoxville, Tenn.				Tennessee River Chattanooga, Tenn.		
	above	at	below	below	above	below	below
River Miles Above: Mouth of Tennessee	650.5	645.5	638.9	625.1	472.1	460.8	452.2
Period - 1936	Aug.	Aug.	Aug.	Aug.	July	July *	July
Number of Samples	3	3	3	3	4	4	4
Flow in c.f.s.:							
Sampling Days	4,500	4,500	4,300	4,600	15,800	16,200	16,500
Minimum Month	1,830	1,830	1,830	1,830	-	-	-
Water Temperature °C.	28.3	29.2	29.3	29.0	28.4	28.4	28.5
Coliforms per ml.	33	650	900	75	23	700	425
Dissolved Oxygen ppm.	5.72	5.14	4.39	4.95	5.91	6.03	5.56
B.O.D., 5-day, p.p.m.	1.12	1.57	1.32	1.20	1.24	1.04	1.29

River Location	Tennessee River Decatur			Tenn. R. above Florence	Tennessee River below Tuscumbia		Tenn. R. Nortons Bluff Br.
	above	below	below				
River Miles Above: Mouth of Tennessee	307.6	302.5	296.0	256.6	251.8	241.5	5.3
Period - 1937	June *	June *	June *	Aug.	Aug.	Aug.	Sept. 1940
Number of Samples	5	5	5	3	4	3	4
Flow in c.f.s.:							
Sampling Days	23,400	23,400	23,400	25,200	26,400	25,200	26,300
Minimum Month	-	-	-	3,760	-	-	5,070
Water Temperature °C.	27.7	28.0	28.0	28.8	28.9	28.7	22.3
Coliforms per ml.	22	38	26	*	27	7.7	**
Dissolved oxygen ppm.	6.91	6.78	6.97	7.43	7.08	6.78	8.2
B.O.D., 5-day, p.p.m.	.86	1.13	1.32	.98	1.10	.93	.8

Main River - Most Unfavorable Coliform Results

River Location	Tennessee River Knoxville				Tenn. R. below Loudon	Tennessee River Chattanooga	
	above	at	below	below		above	below
River Miles Above: Mouth of Tennessee	650.5	645.5	638.9	625.1	591	472.1	457.1
Period -	Oct. '36	June '36	Sept. '36	July '36	Feb. '41	Jan. '37	Sept. '36
Number of Samples	4	4	4	3	3	2	2
Flow in c.f.s.:							
Sampling Days	15,100	5,200	4,200	6,700	9,080	121,000	14,200
Minimum Month	1,830	1,830	1,830	1,830	2,860	3,990	3,990
Water Temperature °C.	17.6	27.0	26.6	26.7	5.0	12.0	26.0
Coliforms per ml.	170	1,800	2,000	325	11	100	2,200
Dissolved oxygen ppm.	7.51	6.34	4.42	5.84	11.0	9.57	6.25
B.O.D., 5-day, p.p.m.	2.69	1.68	1.88	1.10	3.5	1.42	.82

River Location	Tenn. bel. Chattanooga	Tenn. R. S. Pittsburg	Tenn. R. Bridgeport	Tenn. R. above Florence	Tennessee River below Tuscumbia		Tenn. R. Nortons Bluff Br.
River Miles Above: Mouth of Tennessee	452.2	418	414	256.6	251.8	241.5	5.3
Period -	Sept. '36	Feb. '41	Feb. '41	May '37	June '37	June '37	Nov. '40
Number of Samples	2	3	3	4	4	4	4
Flow in c.f.s.:							
Sampling Days	14,200	13,100	13,100	63,000	22,400	22,400	24,200
Minimum Month	3,990	-	-	3,760	-	-	5,070
Water Temperature °C.	26.5	6.5	6.3	20.8	26.1	25.9	18.9
Coliforms per ml.	2,400	16	20	5.8	8.5	120	4
Dissolved oxygen ppm.	6.24	10.8	10.8	9.52	8.31	7.97	10.2
B.O.D., 5-day, p.p.m.	1.0	1.7	2.1	1.25	1.34	1.20	.7

* Also worst coliform month.

** Less than one.

Table T-5 Tennessee River Basin - Selected Laboratory Data (Continued)

Tributaries

River Location	Powell R. below Big Stone Gap	S. Holston below Bristol	N. Holston at Kingsport	Watauga bel. Elizabethton	Watauga bel. Johnson City	S. Holston below Kingsport	Holston at Mouth
River Miles Above:							
Conf. with Tenn. R.	163	168	142	188	177	143	0.1
Mouth of Tennessee	815	820	794.5	840	829	795	652.2
Period - 1937	Mar. '41	Aug.	Aug.	Mar. '41	Aug.	Aug.	Jan.
Number of Samples	3	3	3	3	3	3	3
Flow in c.f.s.:							
Sampling Days	211	940	600	1,398	970	2,360	19,500
Minimum Month	-	-	-	-	-	-	795
Water Temperature °C.	3.8	24.2	23	6.3	25.5	26.3	10.8
Coliforms per ml.	280	250	23	357	240	950	43
Dissolved oxygen ppm.	12.8	6.7	7.5	6.3	6.4	4.6	9.85
B.O.D., 5-day, p.p.m.	3.0	1.5	.9	9.9	1.4	6.8	2.58

River Location	French Broad at Mouth	French Broad		Pigeon River		Pigeon R. at Newport	Pistol Cr. below Alcoa
		above Asheville	below Asheville	above Canton	below Canton		
River Miles Above:							
Conf. with Tenn. R.	0.4	152	133	139	137	81	12
Mouth of Tennessee	652.5	804	785	791	789.5	733	647
Period -	Oct. '36	Mar. '41	Mar. '41	Mar. '41	Mar. '41	Aug. '37	Feb. '41
Number of Samples	3	1	3	3	3	3	3
Flow in c.f.s.:							
Sampling Days	11,000	903	1,017	128	128	580	28
Minimum Month	1,125	-	328	-	-	158	7
Water Temperature °C.	17.1	1.0	3.2	1.2	4.3	23.7	7.8
Coliforms per ml.	375	24	438	14	1,040	1,600	1,420
Dissolved Oxygen ppm.	7.39	11.0	10.9	12.4	0.9	.9	7.7
B.O.D., 5-day, p.p.m.	2.25	1.8	2.7	1.3	238	7.7	6.6

River Location	Clinch R. at Mouth	Hiwassee at Charleston	Ocoee R. below Copperhill	Ocoee R. at Mouth	Sequatchie at Mouth	Roseberry Cr. below Scottsboro	Spring Cr. 3 Mi. below Huntsville
River Miles Above:							
Conf. qith Tenn. R.	1	15	68	35	-	1	16
Mouth of Tennessee	569	515	568	535	423	383	337
Period - 1941	Aug. '37	Feb.	Feb.	Feb.	Feb.	Feb.	Jan.
Number of Samples	2	3	3	3	3	3	3
Flow in c.f.s.:							
Sampling Days	2,080	1,600	169	602	430	8	54
Minimum Month	400	-	-	-	-	-	-
Water Temperature °C.	22	3.0	5.0	4.5	6.8	5.0	8.5
Coliforms per ml.	350	1	**	1	**	1,980	363
Dissolved Oxygen ppm.	6.02	11.9	6.4	11.6	11.4	8.4	8.2
B.O.D., 5-day, p.p.m.	3.49	0.7	6.0*	0.6	0.7	45	2.2

River Location	Swan Cr. below Athens, Ala.	Richland Creek below Pulaski	Rock Cr. below Tullahoma	Rock Cr. below Lewisburg	Elk below Fayetteville	Duck below Shelbyville	Duck below Columbia
River Miles Above:							
Conf. with Tenn. R.	11	66	172	196	88	216	130
Mouth of Tennessee	311	351	457	306.5	373	326	240
Period -	Jan. '41	Jan. '41	Feb. '41	Jan. '41	Aug. '38	July '38	Aug. '38
Number of Samples	3	3	3	3	2	2	5
Flow in c.f.s.:							
Sampling Days	90	501	5	67	819	318	1,180
Minimum Month	-	30	-	-	115	83	39
Water Temperature °C.	8.5	8.8	5.0	6.5	26	26.5	28.4
Coliforms per ml.	817	337	7,030	410	31	300	600
Dissolved Oxygen ppm.	9.6	10.8	6.9	10.2	6.9	6.2	5.7
B.O.D., 5-day, p.p.m.	3.0	3.8	34.2	2.9	1.3	1.2	1.7

* Seeded and neutralized. ** Less than one.

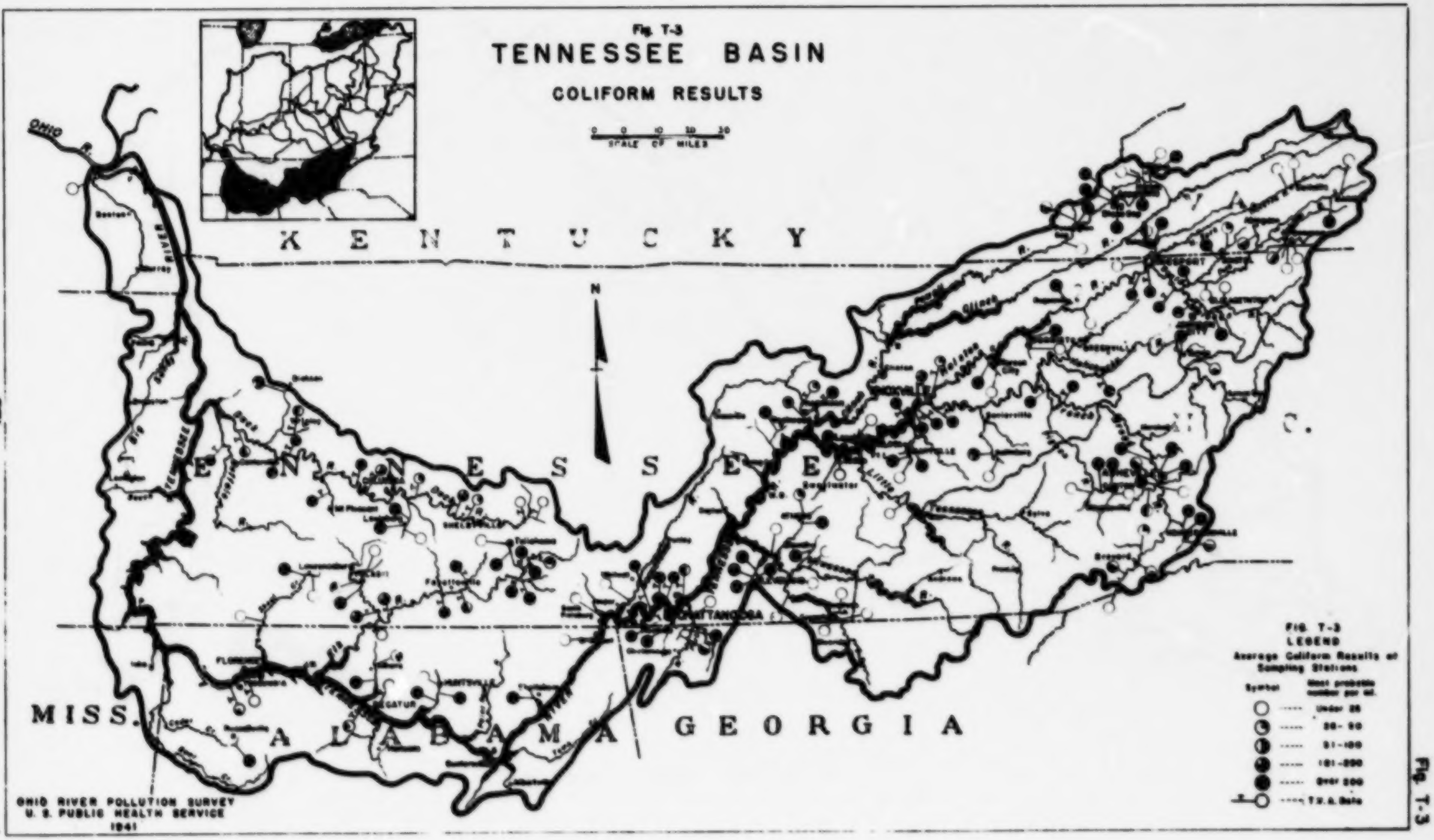


Fig. T-3

TENNESSEE BASIN

COLIFORM RESULTS

OHIO RIVER POLLUTION SURVEY
U. S. PUBLIC HEALTH SERVICE
1941

0 0 10 20 30
SCALE OF MILES
N
KENTUCKY
TENNESSEE
N. C.
MISS.
ALABAMA
GEORGIA
OHIO R.
TENNESSEE RIVER
CHATTANOOGA
KNOXVILLE
KINGSPORT
DECATUR
FLORENCE
SHELBYVILLE
FIG. T-3
LEGEND
Average Coliform Results of Sampling Stations
Symbol
Most probable number per ml.
○ Under 25
◔ 26-50
◑ 51-100
◕ 101-200
● Over 200
T.V.A. Data

Fig. T-4

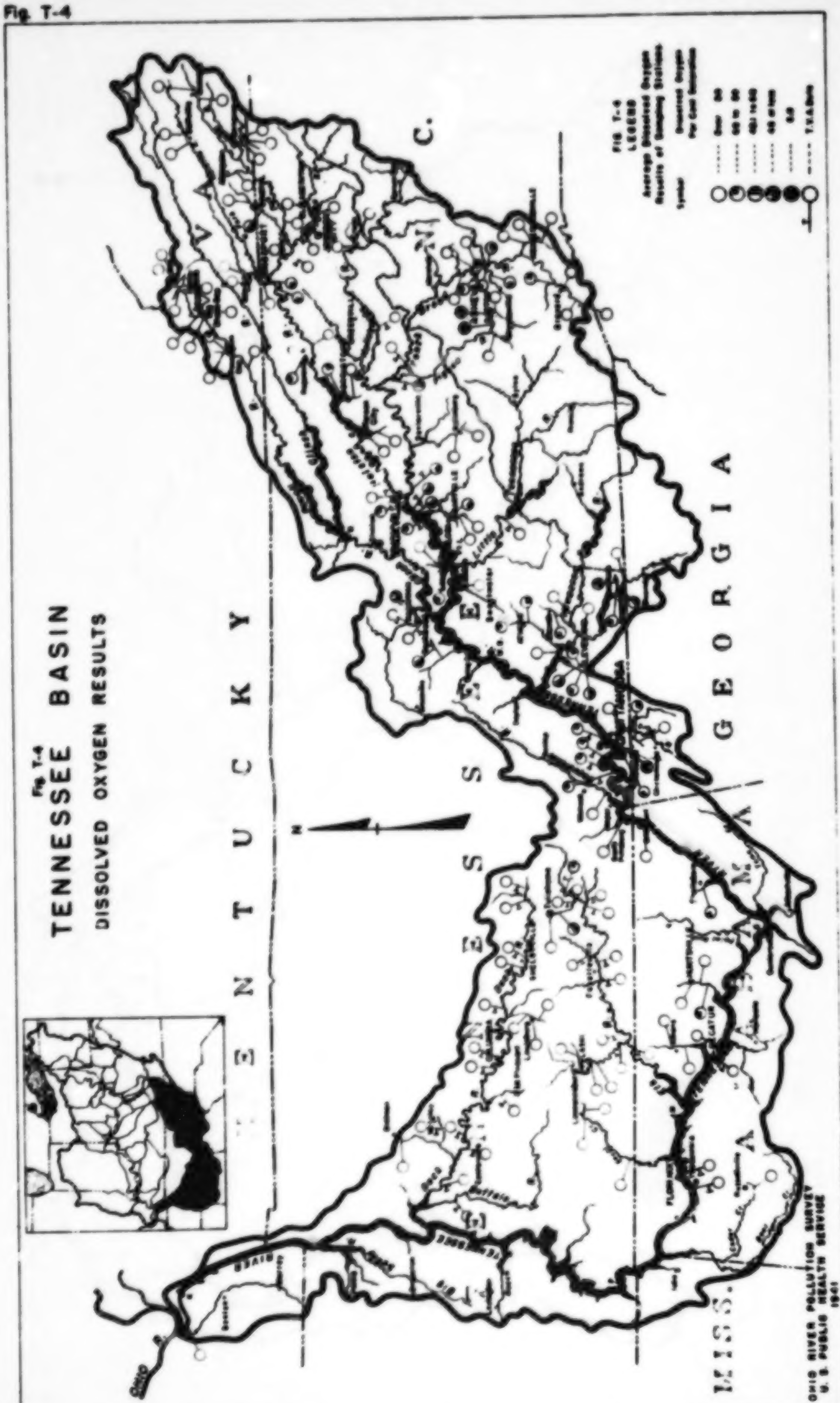


Fig. T-4
TENNESSEE BASIN
DISSOLVED OXYGEN RESULTS
KENTUCKY
TENNESSEE
VA.
N. C.
GEORGIA
ALA.
MISS.
N
Ohio
FIG. T-4
LEGEND
OHIO RIVER POLLUTION SURVEY
U. S. PUBLIC HEALTH SERVICE
1941

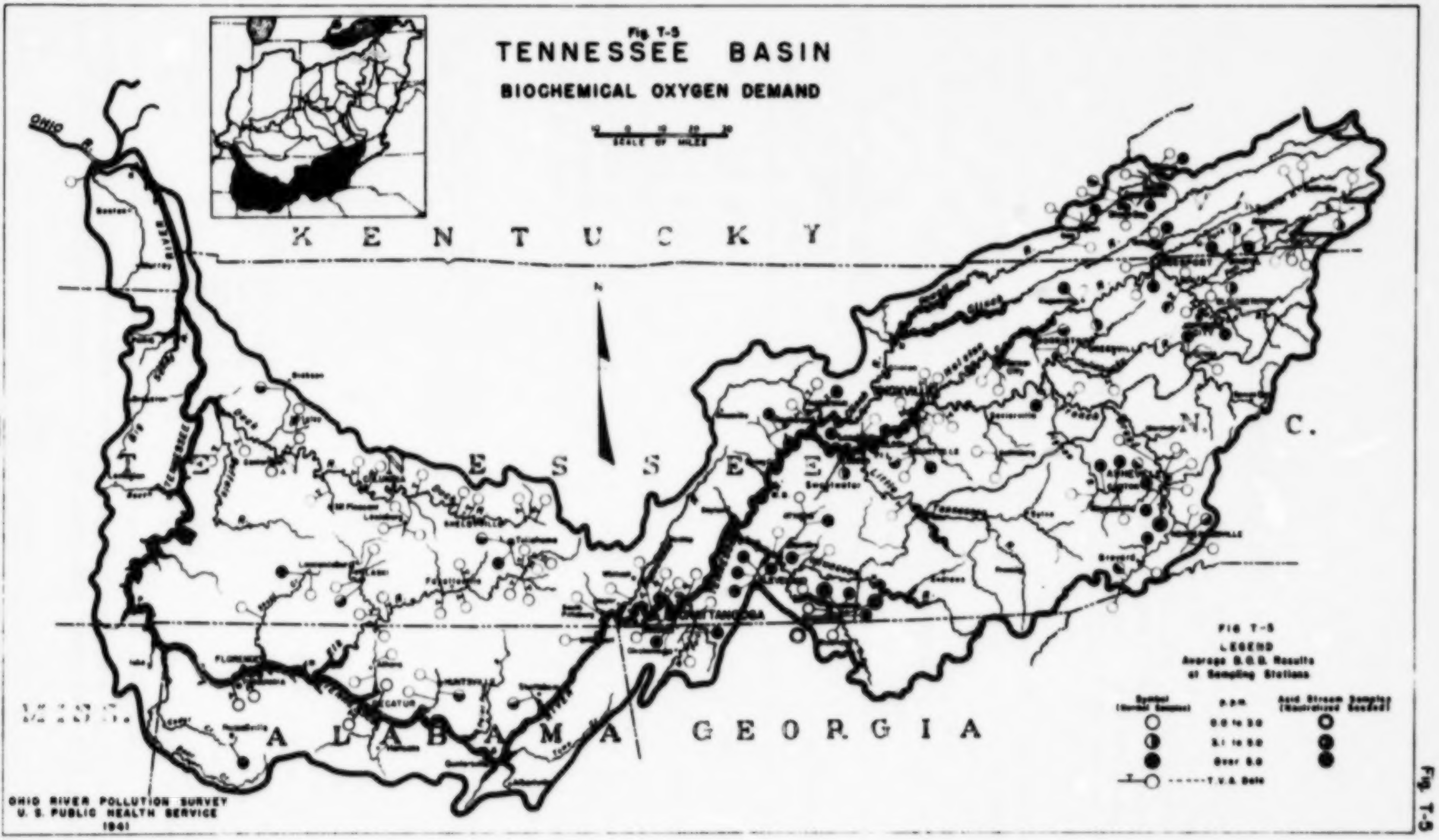


Fig. T-5

TENNESSEE BASIN

BIOCHEMICAL OXYGEN DEMAND

SCALE OF MILES
10
0
10
20
30
N
KENTUCKY
TENNESSEE
N. C.
GEORGIA
ALABAMA
MISS.
OHIO R.
KNOXVILLE
CHATTANOOGA
DECATUR
FLORENCE
FIG. T-5
LEGEND
Average B.O.D. Results
at Sampling Stations
Symbol (Normal Samples)
p.p.m.
Acid Stream Samples (Neutralized Seeded)
○ 0.0 to 3.0 ○
◐ 3.1 to 5.0 ●
● Over 5.0 ●
T.V.A. Data

OHIO RIVER POLLUTION SURVEY
U. S. PUBLIC HEALTH SERVICE
1941

Hydrometric Data

Two hundred and thirty stream gaging stations have been maintained on the Tennessee River Basin for varying periods, 150 stations of which are active at the present time. Eight stations of importance from the pollution standpoint have been selected and the monthly mean summer flows for the three years in which the lowest summer flows have occurred are presented in Table T-6.

Figure T-6 presents low flow frequency curves of the minimum monthly mean flows from June to September, inclusive, for the French Broad River at Dandridge and for the Pigeon River at Newport. These curves indicate that the expectancy of low monthly mean summer flows is as follows:

Location	Minimum Monthly Mean Summer Flows in Cubic Ft./Sec. that may be expected once in			
	2 Years	5 Years	10 Years	Minimum
Newport, Tenn.	500	360	320	158
Dandridge, Tenn.	3,280	2,320	2,000	973

With the completion of the proposed dams in the Tennessee River Basin, the Tennessee Valley Authority estimates the expected minimum weekly average controlled flows (May through September) to be as follows:*

Location	Miles Above Mouth	Flow in Cubic Feet per Second	
		Typical Dry Year	Typical Wet Year
Knoxville	648		
Ft. Loudon Dam	591	4,750	5,250
Watts Bar Dam	530	11,600	17,250
Chickamauga Dam	471	14,900	19,850
Chattanooga	461		
Hales Bar Dam	431	15,500	20,700
Guntersville Dam	349	16,400	25,200
Wheeler Dam	275	17,700	27,800
Wilson Dam	259	18,300	28,400
Pickwick Dam	207	19,900	30,400

* Additional reservoirs now under construction in connection with the defense program will further increase these flows.

Table T-6 Tennessee River Basin - Monthly Mean Summer Flows for Years in which Low Summer Flows Have Occurred.

River Location	Tennessee at Knoxville	Tennessee at Chattanooga	Tennessee at Johnsonville	S.Fk.Holston at Kingsport
River Miles Above:				
Conf.with Tenn.	-	-	-	148
Mouth of Tenn.	648	468	100	800
Drain.Area Sq.Mi.	8,934	21,400	38,520	1,931
Period of Record	1900-40	1874-40	1890-40	1925-40
Year	1904	1881	1897	1930
June c.f.s.	6,660	19,600	26,400	911
July "	5,980	12,400	32,200	662
August "	6,460	8,080	24,100	1,050
September "	3,290	14,500	11,500	736
Year	1925	1883	1903	1932
June "	4,790	25,300	66,800	1,710
July "	3,960	15,700	26,900	1,330
August "	1,830*	10,500	20,700	900
September "	1,850	7,610	11,200	630*
Year	1932	1925	1925	1939
June "	8,240	10,800	14,600	1,409
July "	7,550	9,370	13,600	1,842
August "	5,200	4,760	8,130	1,295
September "	3,130	3,990*	4,780*	634

River Location	Pigeon Newport	Fr. Broad Dandridge	Little Tenn. at McGee	Emory Oakdale
River Miles Above:				
Conf.with Tenn.	6	45	19	21
Mouth of Tenn.	732	697	620	589
Drain.Area Sq.Mi.	655	4,446	2,443	758
Period of Record	1903-29	1919-40	1905-40	1930-40
Year	1914	1919	1914	1930
June c.f.s.	603	5,820	2,660	64
July "	461	4,740	2,680	20
August "	534	3,310	2,260	8
September "	308	1,770	1,620	13
Year	1919	1925	1919	1935
June "	843	2,240	4,720	386
July "	927	2,030	3,610	105
August "	643	981	2,720	108
September "	313	973*	1,420	6*
Year	1925	1932	1925	1936
June "	457	4,670	2,400	16
July "	328	3,750	1,850	48
August "	158*	3,010	1,140	30
September "	180	1,770	609	24

* Minimum Month.

Fig.T-6

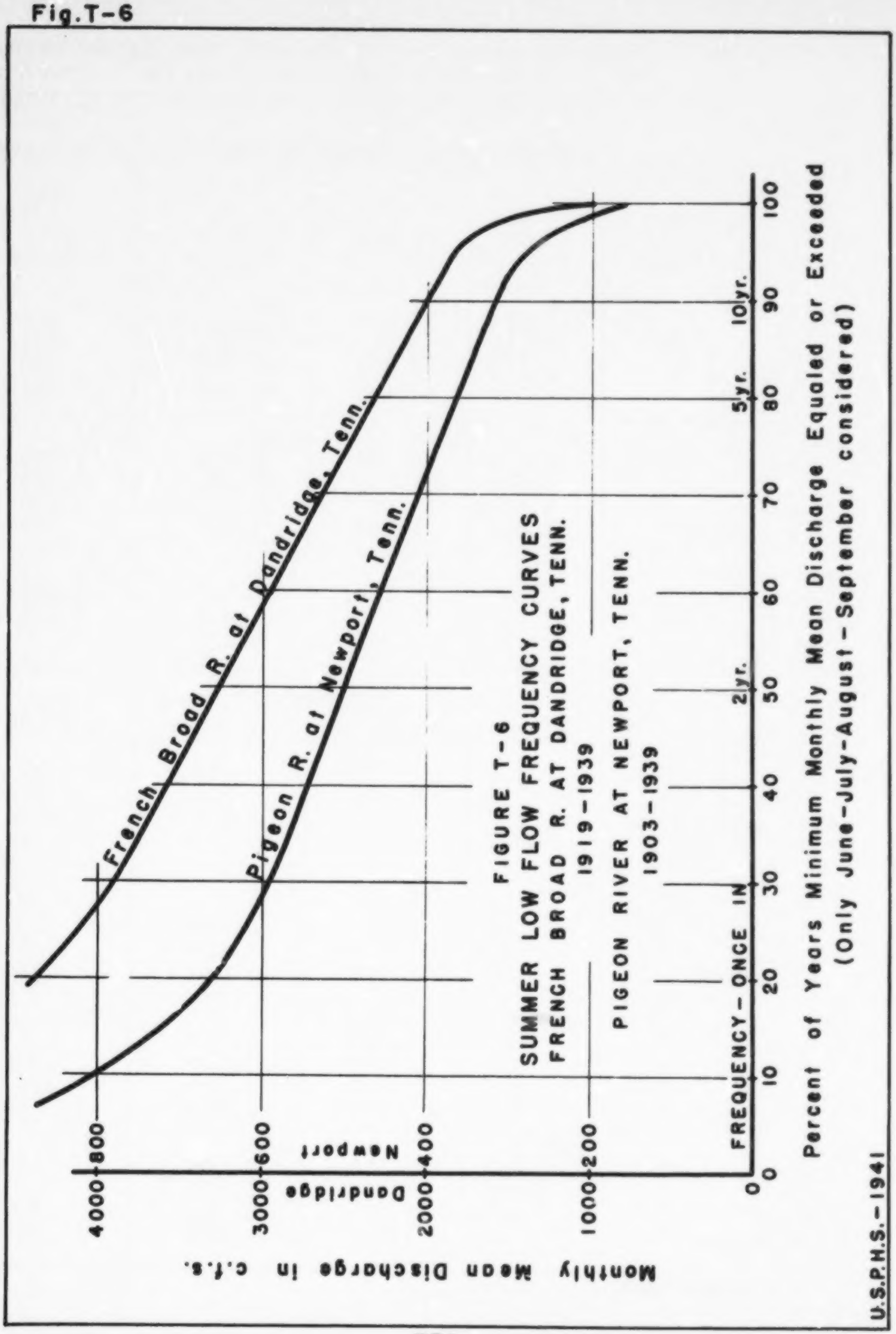


FIGURE T-6
SUMMER LOW FLOW FREQUENCY CURVES
FRENCH BROAD R. AT DANDRIDGE, TENN.
1919-1939

PIGEON RIVER AT NEWPORT, TENN.
1903-1939

Discussion

Due to the rural character of the Tennessee River Basin, there are large areas where problems of pollution are of a minor nature. In many sections of the basin, high stream flows lessen the effects of pollution.

There are a few highly developed industrial areas and pollution problems of consequence are primarily the result of industrial wastes. Only at Chattanooga and Knoxville, Tennessee and at Asheville and vicinity in North Carolina does sewage account for an appreciable portion of pollution problems of more than local significance. Even at these places, industrial wastes are at least equally important with sewage and at Chattanooga, industrial waste dominates the situation.

Pollution problems of consequence, due almost entirely to industrial wastes, exist at and below Harriman and Kingsport, Tennessee and on the Pigeon River in North Carolina and below in Tennessee.

Minor pollution problems, of local significance only, exist at a number of moderate sized and small communities on minor streams. Corrective measures at these points are included in the cost estimates but discussion has been omitted.

Tennessee River

The nine dams located on the main stream make the river essentially a chain of lakes. These dams have reduced the river velocity resulting in the settling out of solids and a decrease in turbidity. The consequent increase in light penetration has stimulated biological activity and this phenomenon has been charged with bringing taste and odor troubles to water plants. The pooling of the river has undoubtedly caused an increased formation of sludge banks in the vicinity of sewer outfalls.

Chattanooga - The metropolitan area is the most highly industrialized area of the basin. A pollutional load of 373,000 population equivalent is discharged to the stream, of which 268,000 is contributed by industry. Chattanooga Creek which receives waste from Rossville, Georgia, and the southern part of Chattanooga (population equivalent 228,000) is probably the most highly polluted stream in the basin. Floating oil, scum, color and septic conditions have made the stream a disgrace. Offensive odors are prevalent and cause local nuisances. The water of Chattanooga Creek is unfit for domestic purposes and most industrial uses and, in addition, pollutes the main river for a considerable distance downstream promoting conditions adverse to further industrial development.

Laboratory findings show dissolved oxygen in the stream falls to 5.5 p.p.m. and it is indicated that values less than this will be found with lower flows. Below the city, coliform organisms in the main river were found to be in excess of 200 per ml. for 50 percent of the months sampled.

Little effort is being made to treat wastes in this area and existing works are either overloaded or not in operation. Unsightly conditions exist near all sewer outlets; discoloration and floating materials are common. The water supply intake is located above nearly all of the local pollution. Difficulties experienced in water treatment have been caused by pollution originating as far upstream as Saltville, Virginia.

Primary treatment works are amply warranted for the prevention of sludge banks and the elimination of floating material. Some benefit to pollution abatement may accrue from the control of low water flow by upstream reservoirs.

Knoxville - This city's wastes have a population equivalent of 171,000, of which 81,000 is attributed to industrial waste. There is no treatment of wastes either domestic or industrial. This load of pollution taxes the river's capacity for recovery and records show dissolved oxygen falling to 4.0 p.p.m. Below the city coliform organisms have averaged 650 per ml. during the summer months. Unsightly floating material is found below the city and septic conditions with resultant odor nuisances may be expected with minimum flows. In view of the present conditions and future possibilities, primary treatment of all wastes should be installed.

The water supply for the city of Knoxville is at times damaged by industrial wastes from upstream plants. This is the most serious condition in the entire basin. During low flows these industrial wastes give the water a high color, create excessive chlorine demands and cause taste and odor troubles. Low flows are usually encountered during the fall and early winter.

French Broad River

This stream and its tributaries drain 13 percent of the total basin, receives 34 percent of the industrial pollution load and 29 percent of the total pollution load. Practically all of the pollution on this watershed arises in North Carolina. No treatment of domestic sewage is practiced and only isolated instances of industrial waste treatment are found. Water supplies, in general, are obtained from the headwaters of the streams so there is little damage to the supplies from wastes. However, the main stream is rendered unsuitable for either domestic or many industrial uses.

Pigeon River - This stream is the principal waste carrying tributary, receiving a pollutional load of 309,000 population equivalent, of which 298,000 is from industrial wastes. For almost its entire length this stream is grossly polluted from paper mills, tanneries and canneries. In color the stream is inky black with quantities of yellowish brown foam on its surface. At times the dissolved oxygen approaches zero and the chlorine demand is high. The effect of wastes discharged to this stream has caused trouble at the Knoxville water plant. During low flows a high color carried over to the filters and the chlorine demand taxed equipment capacity. In addition, real estate values of riparian property have been damaged by the appearance of the stream. One tannery gives preliminary treatment to its industrial waste by sedimentation which greatly reduces its load on the stream. A further reduction of the polluting materials discharged to the Pigeon River is imperative. The problem is difficult of solution because of paper mill waste. A preliminary step that should be taken, and one which will probably be included in the ultimate solution of the problem is sedimentation of all wastes from the paper mills, tanneries and canneries. Increased research in treatment processes with a view of possible recovery of valuable by-products is amply justified.

Asheville, N.C. and Vicinity - Buncombe County, of which Asheville is the county seat, is located along the French Broad River and contributes a pollutional load of 150,000 sewered population equivalent. This county is extensively sewered and practically all wastes not originating on the river banks is discharged to public sewers. Industrial wastes are contributed by rayon, textile and meat packing establishments. None of the wastes are treated and the condition of the stream is such that it is not used for either water supply or recreation. Primary treatment of all wastes to remove color, floating material and solids is indicated.

Brevard, N.C. - Pollution of the French Broad is most serious in this vicinity where industrial wastes from the manufacture of paper, tannic acid and leather have discolored the stream for many miles. Treatment to remove this color is desirable from an aesthetic standpoint and to make the stream usable for water supply and recreation. One tannery in this vicinity uses sedimentation to reduce the strength of its industrial waste.

Holston River

This stream and its tributaries receive a pollutional load of 316,000 population equivalent of which 247,000 is contributed by industrial wastes. Major water supplies are obtained from the river, many of them downstream from large sources of pollution. Recovery of the stream due to natural purification leaves the water at the mouth generally suitable for domestic and most industrial water supplies. Hardness, added by industrial wastes, causes damage for some distance but becomes less objectionable with increased flow in the lower reaches of the river. Nuisance conditions exist in the immediate vicinity of the larger towns.

Kingsport, Tennessee - In and below this city is found the most grossly polluted section of the Holston River. Here it receives the industrial wastes from a rayon and wood products plant, a paper mill and other miscellaneous establishments, in addition to untreated domestic sewage. The river in this section contains considerable floating and suspended matter and presents an unsightly appearance. One large water supply for a paper mill is taken from this polluted section. Remedial measures should be taken to reduce the pollutional load. Primary treatment of domestic sewage by tried methods is indicated. Industrial waste treatment would probably involve segregation of wastes, chemical precipitation and evaporation of strong wastes.

Elizabethton, Tennessee - At this city all wastes are discharged directly to the Watauga River, a tributary of the Holston River. Industrial wastes from the manufacture of rayon contribute a population equivalent of 47,000. By a revision of plant operation and the installation of copper recovery apparatus, one plant has reduced the amount of iron being discharged to the stream with a subsequent improvement in appearance. Viscose rayon waste is passed through basins to neutralize and settle out fiber. There is no treatment of domestic waste and odor nuisances exist in the vicinity of outfalls. Primary treatment of domestic waste and further treatment of the viscose rayon waste is indicated.

The mining and washing of manganese ore has discolored the Watauga River. This situation could be remedied by settling and recirculation of wash waters.

Saltville, Virginia - Industrial wastes of a chemical nature are discharged and add hardness to the North Fork of the Holston River. Treatment by settling removes quantities of solids and under usual conditions dilution is sufficient to care for the effluent. However, on at least two occasions retaining walls have broken, releasing accumulated sludge. This material, high in chlorides, killed fish and caused difficulties with the operation of downstream water supplies. The recurrence of these conditions should be guarded against by proper construction of treatment works.

Little Tennessee River

The only major problem on this tributary is found at Sylva, North Carolina, where the untreated wastes from a paper mill, a tannery and a tannic acid plant grossly pollute the stream. Conditions encountered are typical, brown or black color, foam, high organic and low oxygen content and the usual odors. Physical conditions are favorable for natural purification of the stream but are not sufficient to eliminate the nuisance conditions that prevail for many miles downstream. Plant operations should be revised to permit a minimum of pollutional matter to reach the stream.

Clinch River

This river drains a rural area and, in general, the pollution problems are of minor importance and of local interest only. Harriman, Tennessee, on the Emory River, a tributary of the Clinch, presents the only major problem. Industrial wastes from textile plants and a paper mill have a population equivalent of 79,000 and tax the recovery capacity of the river. During low flows, the river is highly colored and septic conditions exist. There is no treatment of wastes. Conditions may be aggravated when back water from Watts Bar Dam reduces the velocity of the river so that pollution is not rapidly carried downstream. A reduction of the pollutional load is warranted. This could be accomplished by treating textile and domestic wastes by proven methods and a revision of paper mill operation so that a minimum of waste is discharged.

Hiwassee River

The mining of copper and iron and the manufacture of sulphuric acid near Copperhill, Tennessee, release large amounts of inorganic and chemical substances to the river. A load of 136 tons of suspended solids is discharged daily. Many of the solids discharged come from the settling ponds that receive the tailings from the flotation process. The manufacturer is attempting to neutralize the acidity of the waste by the addition of lime so that the stream is not corrosive to metallic structures downstream. The large amount of suspended solids has colored the stream a reddish brown with a floc-like precipitate apparent just below the surface. On reaching Parksville Reservoir, the solids settle out and are gradually filling up the lake. Conditions are aggravated during rains due to excess erosion of the denuded soil. As the stream leaves the Parksville Dam, it has practically recovered from the effects of organic pollution. It is suggested that neutralization of waste be continued and additional efforts made to keep solids out of the river.

Elk River

None of the larger communities on this watershed employ sewage treatment and consequently local nuisance conditions exist below some outfall sewers. There is a history of fish being killed by spills, presumably accidental, of strong waste.

Camp Forrest, Tennessee - This new military camp has taken measures to insure against causing nuisance conditions. Secondary treatment of sewage with provision for chlorination of the effluent has been provided. Despite these precautions, some trouble has been experienced primarily because of a growth to a full load that was not anticipated.

Estimates of cost of suggested remedial measures have been presented in Table T-1.

TABLE T-7 TENNESSEE RIVER BASIN

OHIO RIVER POLLUTION SURVEY
LABORATORY DATA

SUMMARY OF INDIVIDUAL RESULTS

Sampling Point	Mileage from Mouth	Date 1961	Average Discharge c.f.s.	Temp. °C	Dissolved Oxygen p.p.m.	% Sat.	5 Day B.O.D. p.p.m.	Coliform M.P.N. Per ml	pH	Turbidity p.p.m.	Alkalinity p.p.m.	Hardness p.p.m.
North Fk. Holston R. 1 mi. above Saltville, Va.	TeHoNf 880	Feb. 28	74	1.0	13.7	96.4	1.9	**	7.5	5	99	72
" "	" "	Mar. 6	148	2.0	13.0	93.6	2.2	8	7.4	5	66	
" "	" "	" 12	1,640	5.0	12.1	94.2	1.4	24	7.2	69	42	
N. Fk. Holston R. below Alkali Wks. Saltville, Va.	TeHoNf 877	Feb. 28	74	4.0	11.8	89.9	4.3	15	8.8	61	119	62
" "	" "	Mar. 6	148	4.0	12.4	94.1	4.5	4	7.9	10	73	
" "	" "	" 12	1,640	5.0	12.1	94.8	2.1	36	7.2	75	42	
Little Moccasin Cr. Corp. limits abv. Gate City, Va.	TeHoNfLm 810	Mar. 3	3	7.5	13.2	110.0	2.1	15	8.1	5	186	131
" "	" "	" 7	60	7.0	11.4	93.5	4.3	93	7.4	1,700	107	
" "	" "	" 13	10	7.0	11.3	93.0	2.1	110	7.7	25	141	
Little Moccasin Cr. corp. limits below Gate City	TeHoNfLm 808	Mar. 3	3	7.0	12.4	102.1	15.3	2,400	7.9	10	157	141
" "	" "	" 7	60	7.0	11.2	91.9	5.1	230	7.4	1,600	133	
" "	" "	" 13	10	6.5	11.1	89.9	3.2	150	7.7	20	152	
N. Fk. Holston R. 3 mi. north of Kingsport, Tenn.	TeHoNf 702	Mar. 3	775	7.0	13.1	107.6	2.1	1	7.7	5	96	765
" "	" "	" 7	4,280	5.0	12.1	94.4	2.5	24	7.6	55	84	
" "	" "	" 13	8,130	5.0	11.8	91.9	4.2	4	7.5	110	76	
Laurel Creek - above Damascus, Virginia	TeHoSfL 881	Feb. 28	24	0.5	13.7	94.7	1.7	4	7.2	5	43	21
" "	" "	Mar. 6	71	2.0	13.4	97.0	1.5	9	6.7	5	33	
" "	" "	" 12	55	4.0	12.7	96.9	1.4	4	6.5	5	16	
Beaver Creek - above Damascus, Virginia	TeHoSfLB 882	Feb. 28	36	0.5	13.7	95.0	1.2	2	6.6	5	38	13
" "	" "	Mar. 6	208	2.0	13.3	96.0	1.1	4	6.4	5	22	
" "	" "	" 12	140	4.0	12.8	95.5	1.9	4	6.2	25	10	
Beaver Creek - below Damascus, Virginia	TeHoSfLB 879	Feb. 28	60	0.5	13.3	92.4	3.5	93	6.7	5	54	15
" "	" "	Mar. 6	279	2.0	13.0	93.9	1.3	43	6.4	5	21	
Middle Fork Holston R. 2 mi. east of Marion, Va.	TeHoSfMf 1020	Feb. 28	5	2.0	11.7	84.5	2.5	2	7.5	5	96	81
" "	" "	Mar. 6	3	2.0	11.9	85.8	2.9	2	7.5	5	76	
" "	" "	" 12	131	3.0	12.4	92.1	2.0	24	7.3	38	41	
Middle Fork Holston R. W. corp. limits, Marion, Va.	TeHoSfMf 1017	Feb. 28	33	2.0	11.9	85.7	5.1	930	7.5	5	117	84
" "	" "	Mar. 6	40	3.0	11.3	83.7	5.6	430	7.5	10	99	
" "	" "	" 12	131	3.0	12.4	91.7	2.6	430	7.2	49	45	
Wolf Creek sewage disposal plant, Abingdon, Va.	TeHoSfW 863	Feb. 28	15	4.0	11.3	86.4	8.2	43	7.6	10	202	139
" "	" "	Mar. 6	15	6.0	11.3	90.9	6.1	21	7.7	5	197	
" "	" "	" 12	36	7.0	11.0	90.4	4.3	230	7.7	40	168	
S. Fk. Holston River, near Bluff City, Tenn.	TeHoSf 824	Mar. 5	682	5.0	12.9	101.1	0.5	4	7.6	5	99	65
" "	" "	" 11	3,460	6.0	11.3	90.4	3.1	23	7.4	200	70	

TABLE T-7 TENNESSEE RIVER BASIN

OHIO RIVER POLLUTION SURVEY
LABORATORY DATA

SUMMARY OF INDIVIDUAL RESULTS

Sampling Point	Mileage from Mouth	Date 1941	Average Discharge c.f.s.	Temp. °C	Dissolved Oxygen p.p.m.	% Sat.	5 Day B.O.D. p.p.m.	Coliform M.P.N. Per ml.	pH	Turbidity p.p.m.	Alkalinity p.p.m.	Hardness p.p.m.
Beaver Cr. above paper plant, above Bristol, Va	TeHoSfBe 834	Mar. 3	11	7.5	12.3	102.7	1.5	2	8.1	5	212	154
" "	" "	" 7	45	6.0	11.5	91.8	4.0	93	7.8	360	191	
" "	" "	" 13	40	6.5	11.5	93.0	8.4	8	7.9	46	189	
Beaver Cr. city limits below Bristol, Tenn.	TeHoSfBe 832	Mar. 3	17	13.0	5.0	47.2	137.	15,000	8.5	310	290	184
" "	" "	" 7	69	7.0	6.2	51.1	55.6	4,300	9.0	900	159	
" "	" "	" 13	63	8.0	8.4	70.9	56.8	4,300	8.1	111	203	
Watauga River, above Elizabethton, Tenn.	TeHoSfWt 842	Feb. 27	883	5.0	12.3	96.2	3.0	2	7.5	5	54	34
" "	" "	Mar. 5	1,190	5.0	12.7	99.4	2.8	2	7.4	10	51	
" "	" "	" 11	2,120	6.0	11.4	91.7	4.2	9	7.2	65	31	
Watauga R. 1 mi. below rayon plant, Elizabethtn	TeHoSfWt 840	Feb. 27	883	7.0	10.6	86.9	12.0	210	8.6	32	81	45
" "	" "	Mar. 5	1,190	5.0	11.5	89.5	10.5	430	8.2	32	68	
" "	" "	" 11	2,120	7.0	10.6	86.8	7.1	430	7.2	94	37	
Holston River, near Rogersville, Tenn.	TeHo	Mar. 5	1,790	1.5	11.1	78.8	3.1	**	7.5	5	111	162
" "	"	" 11	10200	5.5	10.4	82.6	6.1	21	7.4	170	84	
Croquette Cr. - below Rogersville, Tenn.	TeHoCr	Feb. 27	1	5.0	8.9	69.7	4.7	4,600	7.7	5	215	150
" "	"	Mar. 5	1	1.5	11.4	81.0	7.0	2,400	7.6	5	227	
" "	"	" 11	5	7.0	10.2	84.1	3.9	930	7.6	230	135	
Turkey Creek, above Morristown, Tenn.	TeHoT 732	Feb. 13	1	7.0	11.6	95.6	2.0	9	7.9	5	233	187
" "	" "	" 17	**	7.0	11.5	94.5	1.0	1	7.9	5	225	
" "	" "	" 19	2	2.5	12.8	93.6	1.8	1	7.9	5	230	
Turkey Creek - below Morristown, Tenn.	TeHoT 730	Feb. 13	2	8.0	7.9	66.6	5.5	91	7.6	10	232	192
" "	" "	" 17	2	7.0	8.8	72.6	2.6	430	7.7	5	211	
" "	" "	" 19	3	8.0	10.0	84.4	3.0	230	7.6	5	222	
Mossy Creek - above Jefferson City, Tenn.	TeHoM 702	Feb. 13	9	12.0	9.0	83.1	1.9	2	7.7	5	239	176
" "	" "	" 17	13	12.0	9.6	88.3	1.0	1	7.6	5	233	
" "	" "	" 19	13	11.0	9.9	89.0	1.1	2	7.7	10	230	
Mossy Creek, below Jefferson City, Tenn.	HoM 700	Feb. 13	24	9.0	10.3	89.0	1.4	73	7.8	10	236	176
" "	" "	" 17	20	10.0	10.8	95.3	2.4	750	8.0	30	235	
" "	" "	" 19	16	7.5	11.6	96.8	1.8	930	8.0	10	235	
French Broad River, 1/2 mi. above Rosman, N. C.	TeF 860	Feb. 24	111	0.0	13.3	91.0	0.5	4	6.9	8	21	12
" "	" "	" 27	126	4.0	12.1	92.0	1.1	1	6.9	8	10	
" "	" "	Mar. 4	194	6.5	10.9	93.1	1.1	1	6.9	7	6	
French Broad River, below Rosman, N. C.	TeF 858	Feb. 24	111	0.0	12.8	87.4	3.1	91	6.9	15	16	14
" "	" "	" 27	126	4.0	11.4	87.2	4.2	93	6.9	15	13	
" "	" "	Mar. 4	194	6.5	10.3	88.2	3.7	43	6.9	15	13	

TABLE T-7 TENNESSEE RIVER BASIN

OHIO RIVER POLLUTION SURVEY
LABORATORY DATA

SUMMARY OF INDIVIDUAL RESULTS

Sampling Point	Mileage From Mouth	Date 1941	Average Discharge c.f.s.	Temp. °C	Dissolved Oxygen p.p.m.	Dissolved Oxygen % Sat.	5 Day B.O.D. p.p.m.	Coliform M.P.N. Per ml	pH	Turbidity p.p.m.	Alkalinity p.p.m.	Hardness p.p.m.
French Broad River at Brevard, N. C.	TeF 641	Feb. 24	307	0.5	11.7	80.8	1.0	43	6.9	20	18	11
" "	" "	" 27	280	3.5	11.1	83.4	0.8	43	6.9	10	13	
" "	" "	Mar. 4	353	9.5	9.6	85.1	1.4	43	6.9	9	11	
Davidson River, near Brevard, N. C.	TeFD 638	Feb. 24	54	0.5	10.8	74.8	36.6* 5.5	43	6.9	110	44	39
" "	" "	" 27	66	4.0	9.4	71.4	35.7* 22.0	43	8.9	270	40	
" "	" "	Mar. 4	201	9.5	9.9	86.7	20.4	23	6.9	500	21	
Mud Creek 1/2 mi. above Hendersonville, N. C.	TeFM 830	Feb. 24	34	2.0	12.3	89.0	0.9	4	7.0	25	15	10
" "	" "	" 27	27	5.0	11.6	90.8	2.0	46	6.9	12	2	
" "	" "	Mar. 4	36	9.5	10.8	94.3	1.2	110	6.9	25	12	
Mud Creek 1/4 mi. below Hendersonville, N. C	TeFM 829	Feb. 24	70	2.0	12.0	86.7	2.9	4,600	6.9	20	20	12
" "	" "	" 27	68	5.0	11.8	92.0	2.4	36				
" "	" "	Mar. 4	75	10.5	9.9	88.1	4.8	2,400	6.9	25	14	
Mud Creek - 2 mi. below Hendersonville, N. C	TeFM 828	Feb. 24	112	2.0	12.6	91.0	1.1	2,400	6.9	20	16	15
" "	" "	" 27	112	5.0	11.1	87.0	2.5	230	7.0	15	13	
" "	" "	Mar. 4	154	10.5	10.1	90.3	1.9	43	6.9	65	15	
French Broad River, abv. Hominy Cr. abv. Asheville	TeF	Mar. 6	903	1.0	11.0	77.2	1.8	24	6.9	15	14	
Hominy Cr. outfall rayon plant, Enka, N. C.	TeFH	Feb. 25	62	5.5	9.7	76.8	48.1* 16.6	4	9.6	25	158	15
" "	"	" 28	28	1.0	10.8	76.2	27.0	110	6.9	30	20	
" "	"	Mar. 5	33	2.5	10.3	75.5	16.9	460	6.6	25	16	
Hominy Creek, at mouth	TeFH	Mar. 6	40	2.5	8.3	60.9	35.6* 13.1	240	3.7	30		
French Broad River 1 mi. abv. Asheville, N.C	TeF	Feb. 26	892	2.5	10.6	77.6	5.8	46	6.8	10	2	19
" "	"	Mar. 3	810	3.5	10.8	80.8	4.1	46	6.3	10	6	
" "	"	" 6	905	2.5	10.2	74.7	5.2	240	6.2	20	15	
French Broad R. below industrial plants, Asheville	TeF	Feb. 26	1,000	3.5	11.1	83.4	2.4	75	7.0	12	13	12
" "	"	Mar. 3	952	4.0	11.4	86.9	1.4	93	6.9	8	15	
" "	"	Mar. 6	1,100	2.5	10.9	80.0	1.8	460	6.9	25	18	
French Broad R. 1/4 mi. below Asheville, N.C.	TeF	Feb. 26	1,000	3.5	11.1	83.2	3.4	210	7.0	10	17	14
" "	"	Mar. 3	952	4.5	11.4	88.3	2.8	1,500	6.9	8	12	
" "	"	" 6	1,100	0.5	10.6	73.8	2.3	230	6.9	30	19	
French Broad R. 4 mi. below Asheville, N. C.	TeF	Feb. 26	1,000	3.5	11.1	83.2	2.7	140	7.0	10	16	14
" "	"	Mar. 3	952	5.5	11.2	88.8	2.2	75	6.9	10	12	
" "	"	" 6	1,100	0.5	10.3	71.6	5.3	1,100	6.8	25	20	
Pigeon R. 1/4 mi. above Canton, N. C.	TeFP 791	Feb. 25	126	3.0	12.4	92.0	1.1	9	7.3	4	8	11
" "	" "	" 28	110	0.0	12.7	86.8	1.5	9	6.9	10	12	
" "	" "	Mar. 5	149	0.5	12.1	84.1	1.2	24	6.9	8	10	

TABLE T-7 TENNESSEE RIVER BASIN

OHIO RIVER POLLUTION SURVEY
LABORATORY DATA

SUMMARY OF INDIVIDUAL RESULTS

Sampling Point	Mileage from Mouth	Date 1941	Average Discharge c.f.s.	Temp. °C	Dissolved Oxygen p.p.m.	Dissolved Oxygen % Sat.	5 Day B.O.D. p.p.m.	Coliform M.P.N. Per ml	pH	Turbidity p.p.m.	Alkalinity p.p.m.	Hardness p.p.m.
Pigeon River 1/2 mi. below fibre plant, Canton	TeFP 789	Feb. 25	126	7.0	0.0	00.0	289.* 136	1,100	8.5	250	136	229
" "	" "	" 28	110	1.5	0.0	00.0	313.	1,100	7.2	120	215	
" "	" "	Mar. 5	149	4.5	2.7	20.7	264.	930	7.3	150	96	
Pigeon River, Clyde N.C. 4 mi. below Canton, N.C.	TeFP 784	Feb. 25	126	3.5	0.0	00.0	291.* 138	460	8.9	160	199	148
" "	" "	" 28	110	1.0	0.0	00.0	286.	2,400	7.1	280	162	
" "	" "	Mar. 5	149	1.5	0.0	00.0	230.* 200	930	8.8	120	96	
Richland Creek - near mouth, Waynesville, N.C.	TeFPR 771	Feb. 25	55	3.5	11.8	89.0	2.4	36	6.9	5	13	17
" "	" "	" 28	58	0.5	12.0	83.5	1.5	9	6.9	15	14	
" "	" "	Mar. 5	80	0.0	12.0	82.2	0.8	3	6.2	10	13	
Indian Creek, above Erwin, Tennessee	TeFNI	Feb. 27	10	5.0	12.5	98.0	2.3	9	6.9	5	39	29
" "	"	Mar. 5	37	3.0	13.3	98.7	2.4	24	6.7	5	36	
" "	"	" 11	286	5.0	11.7	91.6	2.0	43	6.6	105	27	
Indian Cr. at Clinchfield RR shops, Erwin, Tenn.	TeFNI	Feb. 27	17	6.0	11.5	92.5	11.4	1,500	7.1	300	47	30
" "	"	Mar. 5	53	3.0	12.6	93.2	6.1	1,600	6.7	460	37	
" "	"	" 11	286	5.0	11.5	90.0	4.9	430	6.7	160	24	
W. Fk. Little Pigeon R. above Gatlinburg, Tenn.	TeFLpWF	Feb. 13	27	4.0	12.3	94.0	1.4	1	6.4	5	13	7
W. Fk. Little Pigeon R. below Gatlinburg, Tenn.	TeFLpWF	Feb. 13	45	4.0	12.6	95.8	1.3	150	6.5	5	11	7
Pistol Creek, Corp. limit above Maryville, Tenn.	TeLP 651	Feb. 17	3	10.0	11.3	99.7	1.2	24	7.9	10	153	
" "	" "	" 19	3	7.5	12.1	100.3	0.5	4	7.9	5	155	
Pistol Creek - above Maryville, Tenn.	TeLP 650	Feb. 14	3	9.0	10.3	88.5	4.8	1,100	7.7	37	160	93
Pistol Creek, below sewage plant, Alcoa, Tenn.	TeLP 647	Feb. 14	30	8.0	6.1	51.4	10.6	930	7.4	32	143	103
" "	" "	" 17	33	9.0	8.6	74.4	3.5	2,400	7.5	10	156	
" "	" "	" 19	21	6.5	8.5	69.0	5.8	930	7.5	10	161	
Town Creek, above Lenoir City, Tenn.	TeT	Feb. 14	5	9.0	8.7	75.4	4.1	23	7.8	20	144	114
" "	"	" 18	5	7.5	12.3	102.0	1.1	24	7.9	5	134	
" "	"	" 20	5	6.5	12.7	103.1	1.4	2	7.9	5	143	
Town Creek, below Lenoir City, Tenn.	TeT	Feb. 14	6	9.0	7.7	66.6	11.4	9,300	7.5	27	140	111
" "	"	" 18	7	9.0	6.2	53.5	22.5	12,000	7.4	45	145	
" "	"	" 20	7	7.0	7.8	64.1	17.0	9,300	7.4	25	146	
Tennessee River, below Loudon, Tenn.	Te 591	Feb. 14	9,080	5.0	11.1	86.8	4.5	9	7.3	15	52	52
" "	" "	" 18	9,080	5.0	10.9	85.2	3.2	7	7.2	10	50	
" "	" "	" 20	9,080	5.0	11.0	85.7	2.9	16	7.2	10	70	
Guest River, above Norton, Virginia	TeCIG 834	Feb. 26	6	1.0	12.9	90.5	1.9	2	6.6	5	23	26
" "	" "	Mar. 4	47	3.0	11.7	86.5	2.7	46	6.5	148	22	
" "	" "	" 10	83	3.0	12.1	89.5	2.1	24	6.2	15	13	

TABLE T-7 TENNESSEE RIVER BASIN

OHIO RIVER POLLUTION SURVEY
LABORATORY DATA

SUMMARY OF INDIVIDUAL RESULTS

Sampling Point	Mileage from Mouth	Date 1961	Average Discharge c.f.s.	Temp. °C	Dissolved Oxygen p.p.m.	Dissolved Oxygen % Sat.	5 Day B.O.D. p.p.m.	Coliform M.P.N. Per ml	pH	Turbidity p.p.m.	Alkalinity p.p.m.	Hardness p.p.m.
Guest River, below Norton, Va.	TeC1G 832	Feb. 26	9	2.0	9.9	71.2	19.6	24,000	6.7	10	42	60
" "	" "	Mar. 4	51	3.0	11.2	83.4	9.5	3,900	6.5	131	27	
" "	" "	" 10	89	3.0	11.7	86.8	3.9	2,400	6.2	15	19	
Gladly Creek - Corp. limit, above Wise, Va.	TeC1GG1	Feb. 26	**	0.5	11.4	79.2	2.4	1	6.3	5	20	19
" "	"	Mar. 4	3	1.0	12.0	84.3	4.3	36	6.0	280	14	
" "	"	" 10	4	1.0	12.2	85.9	1.5	1	6.1	25	15	
Gladly Creek, rear of school, below Wise, Va.	TeC1GG1	Feb. 26	1	2.0	10.1	72.7	24.7	4,600	7.1	15	43	34
" "	"	Mar. 4	20	2.5	12.2	89.2	7.6	240	6.2	170	17	
" "	"	" 10	14	1.5	12.6	89.5	6.3	430	6.5	32	19	
S. Fk. Powell R. above Big Stone Gap, Va.	TeC1PSF 817	Feb. 26	38	5.0	13.6	106.2	3.5	240	7.5	5	115	64
" "	" "	Mar. 4	132	5.0	11.7	91.2	6.4	460	7.1	108	78	
" "	" "	" 10	165	3.5	12.8	96.2	1.8	93	6.7	5	36	
" "	" "	Feb. 26	17	3.0	13.7	101.6	3.0	240	7.0	5	63	47
" "	" "	Mar. 4	77	6.0	11.6	93.1	2.3	1,100	6.9	20	63	
" "	" "	" 10	110	5.5	12.3	97.6	1.7	240	6.7	10	36	
Powell River, below Big Stone Gap, Va.	TeC1P 815	Feb. 26	54	2.0	14.9	107.5	3.0	460	8.0	5	93	60
" "	" "	Mar. 4	244	5.0	10.9	85.2	4.2	230	7.4	80	93	
" "	" "	" 10	319	4.5	12.6	97.3	1.6	150	6.7	10	36	
King Creek - 1 mi. abv. Pennington Gap, Va.	TeC1PK	Mar. 3	2	7.0	10.1	82.7	1.5	15	7.5	5	148	108
" "	"	" 7	21	8.0	10.3	87.1	5.5	240	7.5	650	127	
" "	"	" 13	15	8.0	10.6	89.6	0.9	24	7.5	15	104	
King Creek, below Pennington Gap, Va.	TeC1PK	Mar. 3	2	7.0	9.0	73.6	3.2	930	7.4	5	168	125
" "	"	" 7	26	8.0	8.0	67.7	24.5	2,400	7.4	850	137	
" "	"	" 13	20	7.5	10.4	85.5	1.5	1,200	7.5	10	116	
Powell River, west of Dot, Va.	TeC1P	Mar. 3	80	6.0	13.0	104.2	2.1	4	7.7	5	100	63
" "	"	" 7	390	7.0	11.9	97.9	1.7	9	7.4	20	57	
" "	"	" 13	1,300	7.0	11.4	94.0	1.2	24	7.3	15	40	
Black Creek, below Rockwood, Tennessee	TeKB1 557	Feb. 14	1	9.0	4.8	41.1	14.6	2,400	7.4	25	217	155
" "	" "	" 18	2	8.0	4.8	40.4	23.7	9,300	7.4	15	229	
" "	" "	" 20	1	6.0	5.9	47.0	17.8	2,300	7.4	15	214	
Hiwassee R. abv. mouth Ocoee River, south of Wetmore, Tenn.	TeH 536	Feb. 4	1,060	3.0	12.6	93.5	0.3	4	6.9	25	13	16
" "	" "	" 10	168	1.5	12.9	92.2	0.2	**	6.9	7	17	
" "	" "	" 13	1,650	7.0	12.0	98.4	1.0	**	7.0	10	15	
Cane Creek - below Etowah, Tenn.	TeHC	Feb. 4	1	2.5	10.9	80.0	6.5	24,000	7.3	35	243	191
" "	"	" 10	1	2.0	9.6	69.6	49.4	15,000	7.3	35	267	
" "	"	" 13	**	7.5	7.0	58.1	57.5	24,000	7.3	75	268	

TABLE T-7 TENNESSEE RIVER BASIN

OHIO RIVER POLLUTION SURVEY
LABORATORY DATA

SUMMARY OF INDIVIDUAL RESULTS

Sampling Point	Mileage from Mouth	Date 1941	Average Discharge c.f.s.	Temp. °C	Dissolved Oxygen		5 Day B.O.D. p.p.m.	Coliform M.P.N. Per ml	pH	Turbidity p.p.m.	Alkalinity p.p.m.	Hardness p.p.m.
					p.p.m.	% Sat.						
Ocoee River, above Copper Hill, Tenn.	TeHO 570	Feb. 3	177	4.5	11.7	90.4	0.4	2	6.1	2	14	14
" "	" "	" 7	173	4.5	11.6	89.4	0.4	1	6.5	10	18	
" "	" "	" 12	157	1.0	13.1	92.1	1.0	**	6.9	3	11	
Ocoee River, below Copper Hill, Tenn.	TeHO 568	Feb. 3	177	6.5	8.3	67.2	4.7* 15.6	**	3.4	110		271
" "	" "	" 7	173	6.5	5.1	41.3	4.2* 11.6	**	5.5	400		
" "	" "	" 12	157	2.0	5.7	41.2	7.8* 4.3	**	3.3	70		
Potato Cr. below copper plant, near Ducktown, Tenn.	TeHOP	Feb. 3	8	6.0	1.8	14.7	67.4* 39.7	4	5.5	130		1,249
" "	"	" 7	7	6.0	0.0	00.0	95.5* 23.6	4	5.5	45		
" "	"	" 12	8	3.5	12.0	90.2	86.2* 23.6	**	3.7	175		
Ocoee River, Ref, Tenn.	TeHO	Feb. 3	225	4.5	10.8	83.4	0.8* 1.4	4	6.0	15		109
"	"	" 7	224	4.5	10.6	81.3	1.9* 2.1	**	3.7	4		
"	"	" 12	204	2.0	6.6	47.3	1.2* 1.2	**	5.7	8		
Ocoee River, at mouth	TeHO 535	Feb. 4	175	3.0	11.6	86.0	0.3	4	6.7	5	8	54
"	" "	" 10	1,420	3.0	11.9	88.4	0.8	**	6.7	6	10	
"	" "	" 13	211	7.5	11.2	92.8	0.6	**	6.9	8	9	
Oostanaula River 1/4 mi. above Athens, Tenn.	TeHOo 549	Feb. 4	16	3.5	10.3	77.7	0.7	9	7.5	8	133	131
" "	" "	" 10	15	2.0	10.6	76.2	0.5	240	7.3	3	134	
" "	" "	" 13	15	8.5	9.6	81.9	0.6	75	7.5	8	133	
Oostanaula River, 1/4 mi. below Athens, Tenn.	TeHOo 547	Feb. 4	16	3.5	8.4	63.4	7.8	4,600	7.5	15	138	122
" "	" "	" 10	15	2.0	9.0	65.2	6.9	910	7.3	15	139	
" "	" "	" 13	15	9.0	7.6	65.4	3.4	2,400	7.4	12	138	
Hiwassee River, Charleston, Tenn.	TeH 515	Feb. 4	1,235	2.0	11.4	82.1	0.4	1	7.4	10	51	68
" "	" "	" 10	1,568	1.0	12.4	87.3	0.4	4	7.0	4	34	
" "	" "	" 13	1,861	6.0	11.9	95.3	1.2	**	7.0	20	26	
S. Mouse Cr. below Woolen Mills, Cleveland	TeHSm 532	Feb. 3	1	9.5	7.9	69.1	82.8	75	8.2	70	138	154
" "	" "	" 7	1	7.5	4.1	33.8	36.9	1,100	7.0	170	117	
" "	" "	" 12	1	10.5	7.2	64.8	84.1	230	8.7	210	158	
S. Mouse Cr. below sewage plt, Cleveland, Tenn.	TeHSm 530	Feb. 3	10	7.5	8.3	69.4	14.9	11,000	7.5	10	163	135
" "	" "	" 7	8	6.5	7.1	57.4	13.0	7,500	7.3	15	167	
" "	" "	" 12	7	7.0	7.8	63.6	19.2	9,300	7.3	20	170	
Town Branch, below sewage plant, Cleveland, Tenn.	TeHSmT 530	Feb. 3	1	6.5	9.2	74.9	14.0	24,000	7.5	7	181	155
" "	" "	" 7	1	6.5	8.7	70.9	14.6	9,300	7.4	7	177	
" "	" "	" 12	1	6.0	8.1	65.0	12.8	240,000	7.5	7	180	
S. Mouse Cr. below Junction of town branch, Cleveland, Tenn.	TeHSm 527	Feb. 3	11	6.5	9.2	75.0	3.2	750	7.5	8	143	127
" "	" "	" 7	9	7.0	4.6	37.5	27.7	2,400	7.4	15	181	
" "	" "	" 12	8	7.0	7.8	63.8	5.4	930	7.3	10	165	

TABLE T-7 TENNESSEE RIVER BASIN

OHIO RIVER POLLUTION SURVEY
LABORATORY DATA

SUMMARY OF INDIVIDUAL RESULTS

Sampling Point	Mileage From Mouth	Date 1941	Average Discharge c.f.s.	Temp. °C	Dissolved Oxygen p.p.m.	Dissolved Oxygen % Sat.	5 Day B.O.D. p.p.m.	Coliform M.P.N. Per ml.	pH	Turbidity p.p.m.	Alkalinity p.p.m.	Hardness p.p.m.
Spring Cr. 1/4 mi. abv. sewage plant, Ft. Oglethorpe, Ga.	TeChSp	Feb. 6	1	3.0	11.5	85.6	1.6	190	7.4	5	152	148
" "	" "	" 14	1	6.5	9.3	75.2	4.0	23	7.3	45	146	
" "	" "	" 18	1	3.0	11.8	87.2	2.0	43	7.6	8	175	
Spring Cr. 100 yds. below sewage plt. Ft. Ogle.	TeChSp	Feb. 6	1	3.5	9.2	69.5	25.8	24,000	7.4	15	144	143
" "	"	" 14	1	6.5	9.4	76.3	5.8	360	7.3	50	148	
" "	"	" 18	1	4.0	11.9	90.9	5.6	36	7.5	5	181	
Chickamauga Cr. mouth Chattanooga, Tenn.	TeCk 473	Feb. 6	257	5.0	11.3	88.3	0.8	9	7.6	7	110	108
" "	" "	" 14	222	6.0	10.8	86.8	1.7	39	7.5	20	117	
" "	" "	" 18	193	6.5	11.4	92.8	1.2	4	7.5	10	121	
Chattanooga Cr. mouth Chattanooga, Tenn.	TeCh 460	Feb. 6	40	5.5	2.6	20.8	276.* 80.4	240	9.6	45	171	95
" "	" "	" 14	70	7.5	0.3	2.7	158.* 99.4	2,400	8.9	140	163	
" "	" "	" 18	24	6.5	0.3	2.7	201.* 98.6	4,600	9.6	290	196	
Big Sequatchie River, mouth, Jasper, Tenn.	TeS	Feb. 5	585	7.0	11.1	91.1	0.6	4	7.2	8	64	65
" "	"	" 11	389	6.0	11.7	94.1	0.8	**	7.3	9	72	
" "	"	" 17	319	7.5	11.4	94.4	0.5	1	7.3	8	75	
Tennessee River, Ferry S. Pittsburg, Tenn.	Te	Feb. 5	14,300	6.0	10.7	85.6	1.6	17	7.0	6	47	59
" "	"	" 11	13,600	6.0	10.6	84.9	1.7	12	7.1	16	50	
" "	"	" 17	11,500	7.5	11.0	91.2	1.5	20	7.1	15	51	
Tennessee River, Ferry Bridgeport, Alabama	Te 434	Feb. 5	14,300	6.5	10.7	87.0	1.4	18	7.2	8	48	61
" "	" "	" 11	13,600	4.5	10.6	81.8	2.6	17	7.1	18	49	
" "	" "	" 17	11,500	8.0	10.9	92.2	2.2	24	7.1	16	53	
Roseberry Creek - 2 mi. below Scottsboro, Ala.	TeR 383	Feb. 5	8	5.0	8.9	69.6	3.0	4,600	7.4	5	132	125
" "	" "	" 11	5	2.0	7.8	56.2	5.9	910	7.3	12	144	
" "	" "	" 17	9	8.0	8.6	72.4	4.5	430	7.3	20	145	
Spring Cr. waterworks, abv. Huntsville, Ala.	TeSp	Jan. 23	34	16.0	9.5	95.4	0.5	2	7.3	2	122	122
" "	"	" 27	67	13.0	9.1	85.8	1.0	4	7.3	2	126	
" "	"	" 29	48	11.0	9.0	81.0	1.2	2	7.3	3	126	
Spring Creek, below sewer, below Huntsville	TeSp	Jan. 23	37	15.5	7.6	75.3	6.4	24,000	7.4	15	131	124
" "	"	" 27	73	7.5	10.6	88.2	2.4	360	7.4	25	93	
" "	"	" 29	52	5.0	10.9	85.1	2.0	72	7.5	5	101	
Spring Creek- 3 miles below Huntsville, Ala.	TeSp	Jan. 23	37	12.5	6.5	61.0	3.1	430	7.2	4	110	112
" "	"	" 27	73	7.5	8.9	74.4	1.8	430	7.5	21	115	
" "	"	" 29	52	5.5	9.1	72.1	1.7	230	7.5	9	113	
Swan Creek, above Athens, Alabama	TeSw 316	Jan. 23	38	11.0	10.9	98.4	0.5	8	6.9	7	26	26
" "	" "	" 27	145	7.0	11.2	91.9	0.9	46	6.9	20	23	
" "	" "	" 29	56	4.0	12.1	92.2	0.8	24	6.8	5	11	

TABLE T-7 TENNESSEE RIVER BASIN

OHIO RIVER POLLUTION SURVEY
LABORATORY DATA

SUMMARY OF INDIVIDUAL RESULTS

Sampling Point	Mileage From Mouth	Date 1941	Average Discharge c.f.s.	Temp. °C	Dissolved Oxygen		5 Day B.O.D. p.p.m.	Coliform M.P.N. Per ml.	pH	Turbidity p.p.m.	Alkalinity p.p.m.	Hardness p.p.m.
					p.p.m.	% Sat.						
Swan Creek, below sewer Athens, Alabama	TeSw 311	Jan. 23	44	14.0	6.8	65.5	7.3	2,400	6.8	15	58	42
" "	" "	" 27	163	7.0	10.2	83.4	0.9	36	6.1	20	12	
" "	" "	" 29	66	4.5	12.0	92.1	0.8	15	6.9	10	19	
Rock Creek, above Tullahoma, Tenn.	TeElRc 455	Feb. 3	4	5.5	10.5	82.9	4.9	4	6.7	5	31	27
" "	" "	" 5	3	4.5	11.2	86.4	2.3	2	6.7	5	48	
" "	" "	" 7	4	5.0	10.4	81.4	2.1	1	6.9	5	46	
Rock Creek, below Tullahoma, Tenn.	TeElRc 457	Feb. 3	6	5.5	7.0	55.1	49.2	7,500	6.7	20	56	31
" "	" "	" 5	4	4.5	8.0	61.3	24.6	4,300	6.9	25	72	
" "	" "	" 7	4	5.0	5.8	45.5	28.8	9,300	6.9	31	73	
Pigeon Roost Cr. below phosphate plant, above Pulaski, Tenn.	TeElRP	Jan. 23	11	12.0	11.2	103.8	1.4	4	6.8	150	72	117
" "	"	" 27	71	8.0	11.2	94.6	0.7	9	6.9	30	58	
" "	"	" 29	34	5.5	11.6	91.6	1.8	2	6.9	90	53	
Richland Creek, above Pulaski, Tenn.	TeElR 352	Jan. 22	132	9.5	11.9	104.0	0.8	2	7.7	10	120	138
" "	" "	" 24	470	11.0	10.1	92.4	3.2	110	7.4	550	95	
" "	" "	" 28	900	6.0	11.1	88.8	2.3	15	7.5	25	96	
Richland Creek, below Pulaski, Tenn.	TeElR 351	Jan. 22	132	10.0	11.3	99.4	4.2	460	7.6	20	119	122
" "	" "	" 24	470	11.5	10.0	91.2	5.9	460	7.4	250	102	
" "	" "	" 28	900	5.0	11.2	87.6	1.3	91	7.5	25	95	
Shoal Creek, above Lawrenceburg, Tenn.	TeSh 324	Jan. 22	38	13.0	10.8	102.4	0.5	15	7.4	4	79	91
" "	" "	" 24	60	13.0	9.8	92.9	1.8	46	6.8	1,200	60	
" "	" "	" 28	51	7.5	10.6	87.8	0.9	9	7.3	5	55	
Shoal Creek, below Lawrenceburg, Tenn.	TeSh 322	Jan. 22	38	11.0	10.8	97.1	9.3	2,400	7.4	10	88	69
" "	" "	" 24	60	12.0	8.9	82.3	5.4	2,400	6.8	500	57	
" "	" "	" 28	51	4.5	10.9	83.7	5.1	4,600	7.2	8	55	
Shoal Creek - bridge Iron City, Tennessee	TeSh 275	Jan. 22	212	8.5	12.0	102.6	0.8	4	7.4	3	60	56
" "	" "	" 24	355	10.5	10.5	93.5	0.8	9	7.0	120	52	
" "	" "	" 28	990	5.5	11.5	91.1	0.7	4	7.0	10	39	
Mud Creek, below Russellville, Ala.	TeBM 293	Jan. 22		16.0	7.6	76.1	15.0	11,000	7.4	3	148	123
" "	" "	" 24		17.0	8.2	84.6	6.1	3,900	7.0	350	76	
Rock Creek - above Lewisburg, Tenn.	TeDRc 310	Jan. 28	46	4.5	11.4	88.0	1.1	9	7.5	8	138	
Rock Creek, above Lewisburg, Tenn.	TeDRc 309	Jan. 22	5	9.0	11.6	100.1	0.9	46	8.3	4	160	162
" "	" "	" 24	146	11.5	8.8	80.7	2.0	1,100	7.5	300	116	
Rock Creek, below Lewisburg, Tenn.	TeDRc 307	Jan. 22	5	10.5	10.7	95.1	1.5	93	7.9	2	181	164
" "	" "	" 24	146	12.0	8.6	79.7	6.2	1,100	7.4	1,200	116	
" "	" "	" 28	46	3.0	11.4	84.4	1.0	36	7.6	5	152	

TABLE T-7 TENNESSEE RIVER BASIN

OHIO RIVER POLLUTION SURVEY
LABORATORY DATA

SUMMARY OF INDIVIDUAL RESULTS

Sampling Point	Mileage From Mouth	Date 1941	Average Discharge c.f.s.	Temp. °C	Dissolved Oxygen p.p.m.	Dissolved Oxygen % Sat.	5 Day B.O.D. p.p.m.	Coliform M.P.N. Per ml.	pH	Turbidity p.p.m.	Alkalinity p.p.m.	Hardness p.p.m.
Piney Creek 1½ miles below Dickson, Tenn.	T-DP	Jan. 23	3	9.0	10.1	86.8	2.5	75	7.5	5	128	91
" "	" "	" 27	13	7.0	10.7	87.6	2.5	230	7.4	10	82	
" "	"	" 29	9	6.0	10.9	87.0	1.9	230	7.4	5	96	
" "	"	" 31	8	8.0	10.7	90.5	5.7	39	7.4	10	102	
Tennessee River Burton's Bluff Bridge	T- 5.3	1940 Sept. 21	22,600	25.5	8.2	99.0	0.9	2	7.7	10	57	72
" "	" "	" 25	25,800	22.0	8.0	90.1	0.8	**	7.7	10	59	
" "	" "	" 26	30,600	21.0	8.3	92.1	0.8	2	7.7	10	58	
" "	" "	Oct. 1	26,300	20.5	8.4	92.6	0.7	**	7.7	10	61	
" "	" "	Nov. 14	32,100	10.5	9.7	86.2	0.7	4	7.1	85	51	
" "	" "	" 15	31,600	8.5	10.3	87.8	0.7	2	7.3	35	52	54
" "	" "	" 16	30,500	7.5	10.4	86.8	0.8	9	7.1	43	50	
" "	" "	" 18	30,000	9.0	10.3	89.0	0.6	2	7.1	43	50	
" "	" "	1941 Mar. 1	23,700	5.5	13.5	107.0	2.0	1	7.7	32	66	
" "	" "	" 4	23,200	7.0	13.0	106.6	1.5	**	7.6	35	64	86
" "	" "	" 5	25,600	7.0	12.8	105.4	1.4	1	7.7	40	64	

* Seeded and neutralized.

** Less than one

TABLE T-7 TENNESSEE RIVER BASIN

OHIO RIVER POLLUTION SURVEY
LABORATORY DATA

SUMMARY OF AVERAGES

By Tennessee Valley Authority

Sampling Point	Mileage from Mouth	Period 1937-38	Number of Samples	Average Discharge c.f.s.	Temp. °C	D.O. p.p.m.	5 Day B.O.D. p.p.m.	Coliform M.P.N. Per ml.	pH	Turbidity p.p.m.	Alkalinity p.p.m.	Hardness p.p.m.
N.Fk.Holston R.-Mouth Near Kingsport, Tenn.	TeHoNF 794.5	May-Oct.		800	22.6	8.4	1.2	190	7.8		77	378
" "	" "	Nov.-Apr		1,010	6.8	11.2	0.9	20	7.8		67	303
S.Fork Holston River Above Beaver Creek	TeHoSF 725	May-Oct.		1,210	21.2	8.2	1.0	230	7.8		85	91
" "	" "	Nov.-Apr		1,240	9.6	11.3	0.7	13	7.8		86	91
Beaver Creek - Mouth Near Bristol, Tenn.	TeHoSFB 825	May-Oct.		180	20.8	7.4	3.7	1,500	7.8		172	185
" "	" "	Nov.-Apr		160	10.7	10.2	3.0	375	7.8		173	185
S.Fk.Holston R.-Below Beaver Cr-Abv.Watauga	TeHoSF 820	May-Oct.		1,420	21.5	8.2	1.3	375	7.9		97	102
" "	" "	Nov.-Apr		1,420	10.1	11.4	1.0	28	7.9		97	103
Watauga River - Below Elizabethton, Tenn.	TeHoSFW 831	May-Oct.		870	20.7	7.8	1.3	80	7.7		45	52
" "	" "	Nov.-Apr		1,180	9.3	10.7	1.2	8	7.7		40	45
Watauga River - Below Johnson City, Tenn.	TeHoSFW 829	May-Oct.		890	21.0	7.7	2.1	110	7.7		47	54
" "	" "	Nov.-Apr		1,130	9.4	10.7	1.4	17	7.7		43	48
S.Fk.Holston R.-Below Watauga River	TeHoSF 810	May-Oct.		2,330	21.7	7.4	3.3	350	7.7		77	87
" "	" "	Nov.-Apr		2,610	10.0	10.9	1.2	21	7.7		76	84
S.Fk.Holston R.- Below Kingsport, Tennessee	TeHoSF 795	May-Oct		2,510	22.6	6.1	5.9	475	7.5		81	98
" "	" "	Nov.-Apr		3,030	9.7	10.2	3.0	34	7.7		82	93
Holston River - Below N.Fk.Holston River	TeHo 784	May-Oct.		3,340	22.7	7.0	2.0	170	7.6		81	155
" "	" "	Nov.-Apr		4,160	9.4	10.3	1.4	27	7.7		84	138
French Broad R.-Above Pigeon River	TeFB 730.5	May-Oct.		3,650	21.3	7.5	1.1	400			16	16
" "	" "	Nov.-Apr		2,990	9.5	10.8	1.0	130			15	15
Pigeon River - Above Newport, Tennessee	TeFBP 733	May-Oct.		890	20.5	5.0	9.2	190	7.6		47	59
" "	" "	Nov.-Apr		1,330	9.3	8.9	10.0	27	7.6		35	47
Pigeon River-Below Newport, Tennessee	TeFBP 732	May-Oct.		890	20.4	4.6	5.8	650	7.3		42	52
" "	" "	Nov.-Apr		1,330	9.2	8.5	8.7	60	7.2		34	46
Nolichucky R.-Below Greeneville, Tennessee	TeFBN 758	May-Oct.		910	21.6	7.4	1.1	160	7.4		45	46
" "	" "	Nov.-Apr		1,480	9.4	10.6	0.8	19	7.4		47	49
Little Tennessee River Below Cheoah Dam	TeLiTe 668	August		4,840	23.9		0.4			50	9	8
Clinch River - Above Clinton, Tennessee	TeC 627	May 12		162	21.0	7.8	0.8	1	7.7	15	93	95
" "	" "	May 19		249	22.0	7.0	1.1	72	7.6	100	86	94
Clinch River - Below Clinton, Tennessee	TeC 625	May 12		162	21.5	7.8	1.5	110	7.7	15	92	95
" "	" "	May 19		253	22.0	6.7	1.3	160	7.6	40	88	96
Emory River Oakdale, Tennessee	TeCE 590	May-Oct.		1,190	22.1	7.8	0.7	45	6.9		10	16
" "	" "	Nov.-Apr		1,180	9.3	11.0	0.5	10	6.8		7	13
Emory River-Below Harriman, Tennessee	" 579	May-Oct.		1,270	23.5	4.8	7.7	700	6.8		25	27
" "	" "	Nov.-Apr.		1,240	10.2	9.4	3.3	85	6.8		14	19

TABLE T-7a TENNESSEE RIVER BASIN

OHIO RIVER POLLUTION SURVEY
LABORATORY DATA

SUMMARY OF AVERAGES

By Tennessee Valley Authority

Sampling Point	Mileage From Mouth	Period 1937-38	Number of Samples	Average Discharge c.f.s.	Temp. °C	D.O. p.p.m.	5 Day B.O.D. p.p.m.	Coliform M.P.N. Per ml.	pH	Turbidity p.p.m.	Alkalinity p.p.m.	Hardness p.p.m.
Clinch River - Mouth	TeC 569	May-Oct.		5,220	19.2	8.0	1.4	120	7.5		73	79
" "	" "	Nov-Apr.		5,710	11.2	10.0	1.0	27	7.3		59	65
Chattanooga Creek At Mouth	TeCh 461	Oct. '37		112	16.6	1.2	30.0	6,090	6.4	36	93	
Elk River - Below Estill Spring Dam	TeEl 451	May-Nov.		286	19.3	7.2	1.0	65	7.2	55	81	87
Rock Creek - Mouth	TeElRo 442	May-Nov.		46	18.8	8.0	0.9	29	7.1			
Elk Creek - Below Tullahoma, Tennessee	TeEl 439	May-Nov.		359	19.2	7.9	0.6	2,100	7.3			
Boiling Fk.Crk.-Below Winchester, Tennessee	TeElB 435	May-Nov.		89	18.1	8.4	0.9	450	7.3			
Elk River - Below Winchester, Tennessee	TeEl 432	May-Nov.		536	19.9	8.2	0.7	250	7.3			
Mulberry Creek-Below Lynchburg, Tennessee	TeElM 387	May-Nov.		66	20.6	7.3	1.1	2,200	7.4			
Elk River - Below Lynchburg, Tennessee	TeEl 385	May-Nov.		738	20.7	7.5	0.9	80	7.3			
Elk River - Below Fayetteville, Tenn.	TeEl 373	" "		822	21.6	7.7	0.9	240	7.4			
Elk River - Above Pulaski, Tenn.	TeEl 334	" "		941	22.3	8.1	0.9	160	7.3			
Richland Creek - near mouth - Pulaski, Tenn	TeElR 330	May-Nov.		117	22.7	7.2	1.2	130	7.4			
Elk River - Below Pulaski, Tennessee	TeEl 321	May-Nov.		1,062	21.9	7.3	0.9	19	7.4	110	90	96
# Duck Creek - Above Manchester, Tenn.	TeD 380	1938 Feb.-Nov.		46	17.7	6.9	0.7	5	7.2	10	47	
# Duck River - Below Manchester, Tenn.	TeD 375	" "		93	17.8	8.6	0.7	13	7.4	13	50	
# Duck River - Above Shelbyville, Tenn.	TeD 336	" "		372	18.7	8.2	1.0	34	7.5	45	80	82
# Duck River - Below Shelbyville, Tenn.	TeD 317	Mar.-Nov.		429	19.2	8.1	1.0	155	7.5	95	86	
# Duck River - Above Rock Creek	TeD 297	" "		376	19.5	8.2	0.9	26	7.5	60	95	
Big Rock Crk.-Mouth Near Lewisburg, Tenn.	TeDBr 293	Feb.-Nov.		91	16.6	8.1	1.4	24	7.8	30	104	
Duck River - Above Columbia, Tennessee	TeD 247	Feb.-Feb		1,575	17.4	8.7	1.6	80	7.7	140	120	120
Duck River - Below Columbia, Tennessee	TeD 241	" "		1,579	17.3	8.4	1.8	480	7.6	160	120	
Duck River - Below Greenlick Creek	TeD 233	" "		1,732	17.3	8.3	1.6	350	7.6	190	122	
Big Bigby Creek-Below Mt.Pleasant, Tenn.	TeDBB 216	1938 Feb.-May		128	15.1	9.6	1.2	240	7.6		95	
Duck River - Below Big Bigby Creek	TeD 209	Feb.-Feb.		1,909	17.3	9.0	1.5	190	7.6	210	121	124
Duck River - Above Centerville, Tenn.	TeD 193	" "		2,273	17.2	9.0	1.6	120	7.6	220	115	
Duck River - Below Centerville, Tenn.	TeD 175	1938 Feb.-Nov.		1,959	20.2	8.4	1.4	170	7.6	220	107	
Piney River Below Wrigley, Tenn.	TeDP	Feb.-Nov.		202	16.5	7.5	1.4	100	7.6	40	106	
Duck River - Below Piney River	TeD 143	Feb.-Nov.		2,470	20.1	8.5	1.8	95	7.6	140	104	
Buffalo River - Below all wastes	TeDBu	Feb.-Nov.		985	20.4	3.3	0.7	52	7.3	40	52	

Duck River results made available through the joint cooperation of the State of Tennessee and the Tennessee Valley Authority.